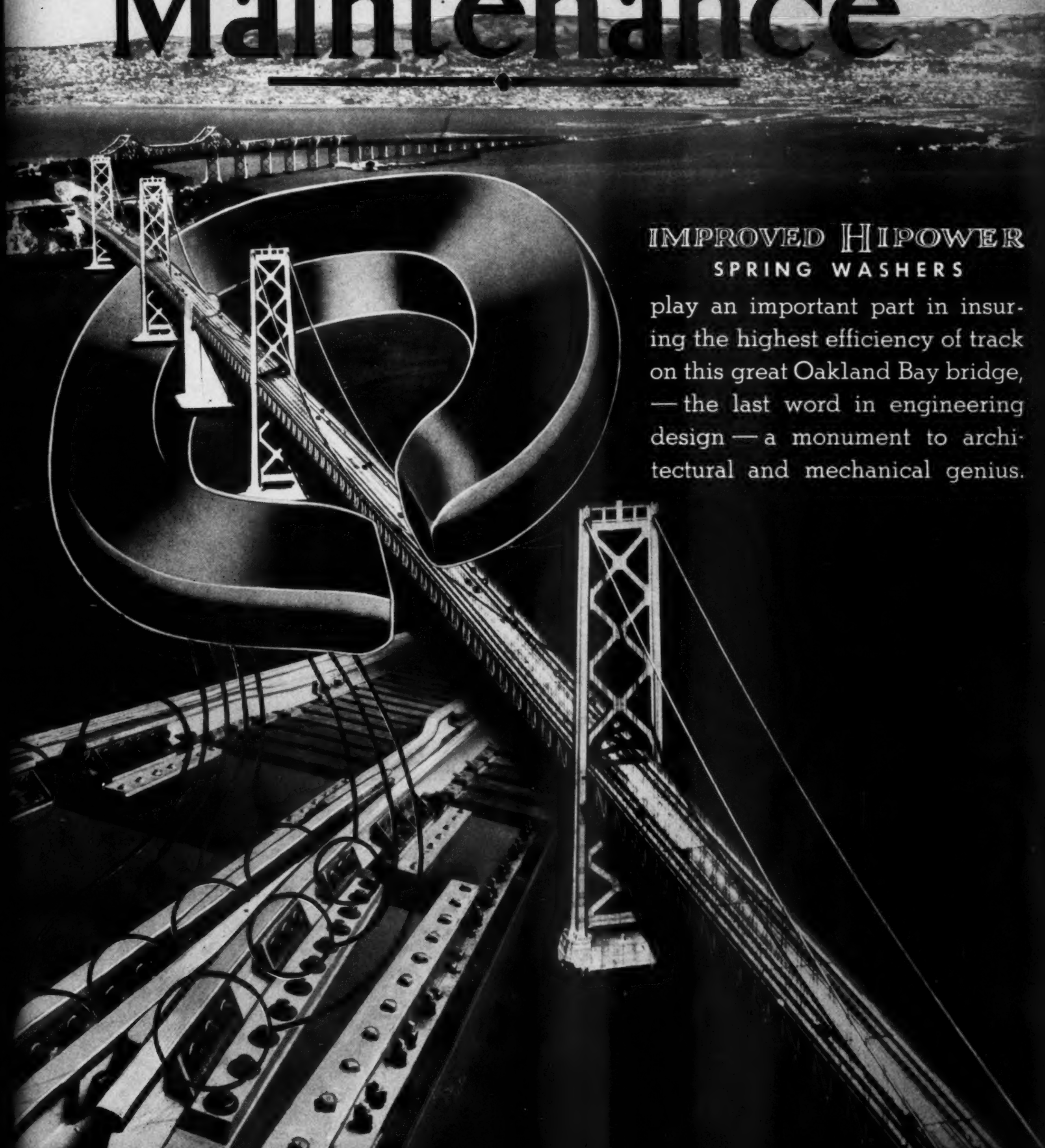
AUGUST, 1940

Railway Engineering and Maintenance



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2 ADVANTAGES OF THE ADJUSTABLE SPRING RAIL BRACE

A TEST INSTALLATION WILL SHOW YOU

A properly adjusted rail brace will cut down maintenance of switches. Yet a check of any high-speed turnout or cross-over on your system will show you how difficult it is to keep ordinary braces in adjustment.

We suggest that you make a test installation of the Bethlehem Adjustable Spring Rail Brace on a heavily traveled cross-over. Two advantages will be apparent.

1-minute adjustment. Adjustment is so simple with this Bethlehem brace that braces will not be allowed to remain loose. It takes about one minute. Simply raise the pawl from its slot; drive the contact wedge in approximately a quarter-inch; lock, by dropping the pawl into a new slot.

Fewer adjustments required. This Bethlehem brace absorbs shock. It supports the rail, yet it allows a three to six hundredths of an inch give under heavy lateral thrusts. Consequently the spikes are spared most of the impacts that tend to loosen an ordinary brace.

There are other advantages to the Bethlehem Adjustable Spring Rail Brace: Longer tie life, because of absorbed shock and ample spiking. Reduce maintenance to rolling stock. The greater safety of plug-welded rolled steel.

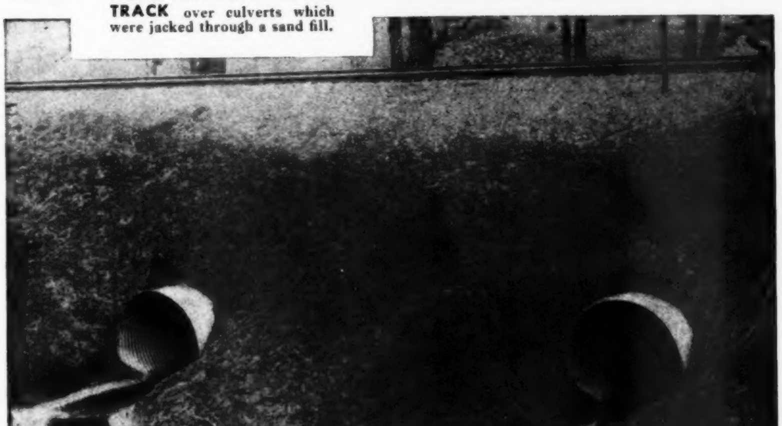
BETHLEHEM STEEL COMPANY

INSTALLING TWO 66-INCH CULVERTS

without slowing down a train!

65 m.p.h. freight train pounding over two corrugated culverts made of U·S·S 8 gage Galvanized Culvert Sheets. Trains didn't even slow down while these culverts were being installed.

NOTE PERFECTLY LEVEL TRACK over culverts which were jacked through a sand fill.



THIS installation of U·S·S Culverts is outstanding for a number of reasons. It had to be placed under a high-speed, double-track main line without interfering with traffic; the 66″ diameter pipe was extra large for a jacking job; the fill was composed entirely of milky-like sand that wouldn't arch and the roadbed was only seven feet from the top of the pipe. In spite of difficulties, the job was finished without even a slow order for either passenger or freight trains.

In addition to this, the settlement of the track since the installation has been practically nil. The section foreman picked up the track once just after the job was finished and only once again since. Naturally, the small amount of surfacing was appreciated by the engineering and operating departments of the railroad.

Railroads are using corrugated metal culverts more and more because they withstand the impact of heavy, fast trains and the stresses of soil movements. They can be installed quickly and easily at low cost and usually without traffic interruptions.

This job was done by one of our culvert fabricators in the mid-west. We'll gladly put you in touch with them or with others in your territory. Just write to one of the companies below for more information.

U·S·S GALVANIZED CULVERT SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
Scully Steel Products Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

TO RAILWAY SUPPLY MANUFACTURERS

"Keeping It Up"

"Bill, you certainly did a fine job in landing that order from the A. B. & C. Railroad last week. It's the first we've ever had from that road—and it's a big one, too," said the sales manager to his star railway salesman.

"Yes, boss, that was a fine order—and I was mighty glad to get it. I've worked on that road for a long time."

"Yes, and I before you. I never could get by the chief. He said his men wouldn't use our product."

"And he always told me that, too."

"What turned the trick then?"

"You did, boss."

"I did? How do you figure that out?"

"It's a long story, boss, but it goes back to the advertising that you've been running in Railway Engineering and Maintenance."

"How's that?"

"It's the fact that you insisted on keeping it running even when I know that the brass hats in our front office wanted you to cut it out to save expenses. You've hit these railway men with our story month after month. You never let them forget us. And our story went beyond the chief to his men out on the line, for they all read that magazine. It's *those* men who turned the trick for us."

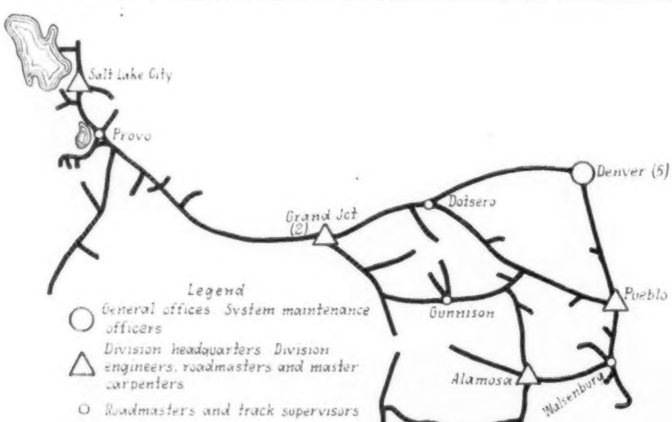
"In what way?"

"Just this. At a staff meeting a few weeks ago, one of the men from way out in the sticks—a man I had never been able to meet—asked the chief why he couldn't get our material. The chief started to shut him off but before he could do so a half dozen other men also asked for it. The upshot of it was that the chief found that his men really wanted our material and that they knew why they wanted it. So he went along with them."

"That's mighty interesting."

"Boss, it's more than that. It's a lesson for us. That advertising got our story across to men that I never met and couldn't afford to call on. It backed up my calls at headquarters and made them productive. That one order paid for several years' advertising."

"It certainly did, Bill. And while that advertising was working here it was working on a lot of other roads in ways that we've not yet heard from. We've got to keep it up. We're *going* to keep it up."



Railway Engineering and Maintenance Goes Every Month to 14 Supervisory Officers on the Denver & Rio Grande Western at the System Headquarters, at **4 Division Headquarters and at 4 Other Supervisory Headquarters,** Scattered All the Way from Denver, Colo., to Salt Lake City, Utah. This Magazine Goes Also to 7 Other Subordinate Officers Who Are in Training for Promotion to Supervisory Positions on This Railway.

TRACK SUPPLY ASSOCIATION
SEPT. 9-12, 1940
EXHIBITOR
HOTEL STEVENS · CHICAGO
ROADMASTERS CONVENTION

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

RAILROADS NOW SAVE $150,000,000 annually here . . .

RAILROADS, THE FIRST and consistently largest users of pressur treated material, are the greatest beneficiaries of its economies Yet a recent analysis of the use of Pressure Treated Woo revealed a number of applications where opportunities fo wider use and greater savings still exist. Why not reviev your maintenance and replacement costs—and check then against the costs of treated timber?

IT IS ESTIMATED that railroads are now saving about $150,000,000 yearly through the use of pressure treated ties. With many of the railroads, the savings from this item alone were enough to make the difference between an operating profit and a loss.

WHY NOT SAVE *OTHER MILLIONS*

PRESSURE TREATMENT adds permanence to all the other advantages of wood for bridge construction. In many cases, life of structures is extended four to five times.

RAILROADS MAINTAIN 100,000 miles of pole lines including 3,500,000 poles. Pressure treatmen extends life from ten to twenty-five years, drasti cally reducing annual replacement costs.

MUCH "mechanical failure" of car lumber is actually induced by decay. One road where untreated stock car lumber lasted 2 to 8 years has obtained 14 years service from treated material, and expects 20 to 25 years life.

RAILROADS SPEND more than $90,000,000 a year to maintain buildings and structures. Pressure treated wood construction is lower in first cost and maintenance as compared to other construction methods; resists mechanical wear; decay and termites and marine borers.

OTHER USES FOR PRESSURE-TREATED TIMBER:

Tipples . . . Piling . . . Guard Rails . . . Fences . . . Poles . . . Buildings, Bins, Sheds . . . Piers . . . Docks, Wharves . . . Platforms . . . Flooring . . . Tanks, Sumps, Vats . . . Crossing Plank . . . Barge Sides and Bottoms . . . Cable Ways . . . Conduit . . . Culverts . . . Flumes . . . Trench Lining and Covers . . . Conveyor Decking and Supports.

OTHER KOPPERS PRODUCTS FOR THE RAILWAY FIELD:

Coal . . . Coke . . . Coal Cleaning and Handling Systems . . . General Engineering and Construction . . . Roofing . . . Waterproofing . . . Cylinder Packing . . . American Hammered Piston Rings . . . D-H-S Bronze . . . Tar Base Paints . . . Weed Killers . . . Car Floats, Ferries . . . Tarmac Paving . . . Disinfectants, Insecticides.

Send for booklets on these products

[redacted]

a KOPPERS subsidiary

the records have been made

by

the tar roofs

Building	Location	Type of Roof	Service Years	Present Condition
Mill	Lawrence, Mass.	Coal tar pitch	46	Good
Mill	Lawrence, Mass.	Coal tar pitch	36	Good
Factory	Pawtucket, R.I.	Coal tar pitch	35	Excellent
Dye Shed	Pawtucket, R.I.	Coal tar pitch	27	Excellent
Warehouse	Omaha, Neb.	Coal tar pitch	23	Good
Store	Minneapolis, Minn.	Coal tar pitch	21	Good
Laundry	Omaha, Neb.	Coal tar pitch	21	Good
Office Building	Paterson, N.J.	Coal tar pitch	17	Good
Mill	Passaic, N.J.	Coal tar pitch	16	Good

If you are buying a roof for a new building . . . or a new roof on an old building . . . your best chance of getting long trouble-free service is by specifying coal tar pitch and tarred felt.

They are the materials used in the roofs that have set up the records for long life . . . 20 years . . . 30 years . . . even 40 or more years.

The best guide to the future is in the past. Put on a roof of Koppers Coal Tar Pitch and Koppers Tar Saturated Felt.

KOPPERS ROOFING AND WATERPROOFING MATERIALS:

Koppers Coal Tar Pitch . . . Koppers Tar-saturated Felt . . . Koppers Tar-saturated Fabric . . . Roof Cements and Roofing Coatings . . . Koppers High Penetration Primer . . . Red Rosin Sheathing Paper . . . Flashing Fabric . . . Parapet Wall Gaskets.

OTHER KOPPERS PRODUCTS:

Coal . . . Coke . . . Pressure-treated Lumber . . . American Hammered Piston Rings . . . Wood Preserving Oils . . . Bituminous Paints and Coatings.

KOPPERS COAL TAR PITCH ROOFS — COAL TAR WATERPROOFING

KOPPERS COMPANY · TAR AND CHEMICAL DIVISION

Pittsburgh, Pa. Kearny, N. J. Providence, R. I. Chicago, Ill. Woodward, Ala.

use KOPPERS products

No. 140 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

August 1, 1940

Subject: They Read The Advertising Too

Dear Reader:

"I agree thoroughly with the engineer maintenance of way to whom you referred in your Letter to Your Readers that was published on Page 430 of the July issue of Railway Engineering and Maintenance.

"The advertising which appears in Railway Engineering and Maintenance is very valuable to me. I make the practice of looking over all advertisements each month. I am always on the lookout for something new or some new use for or some new idea in connection with something we already have.

"Railway Engineering and Maintenance is by far the best individual source of information available to railroad maintenance and if I had to do without it I would feel that I had lost one of my very best friends. I congratulate you heartily on turning out such a splendid magazine each month."—from a nationally-known chief engineer of an important Eastern railway.

"In your last issue I read the article published on the enclosed tear sheet and I am writing to inquire whether you can send me further information regarding the device mentioned therein.

"I have read every page of your magazine (editorial and advertising) for the last seven years. I have also attended every exhibit of maintenance of way materials held in Chicago during this time but have never seen the device referred to on display.

"It seems to me that a device of this character should be of help to every track foreman and I am wondering why its manufacturer is not pushing its sale."—from a track foreman on a Central Western railway.

The above letters, received during the last 10 days, demonstrate a reader interest which we prize greatly. When busy men take time in the midst of many other demands to write us of the help that they find in the pages of Railway Engineering and Maintenance, they place us under heavy obligation to continue to merit this confidence.

And the fact that they expect to find information regarding equipment for their use in the advertising pages presents a thought for manufacturers of maintenance of way materials and equipment.

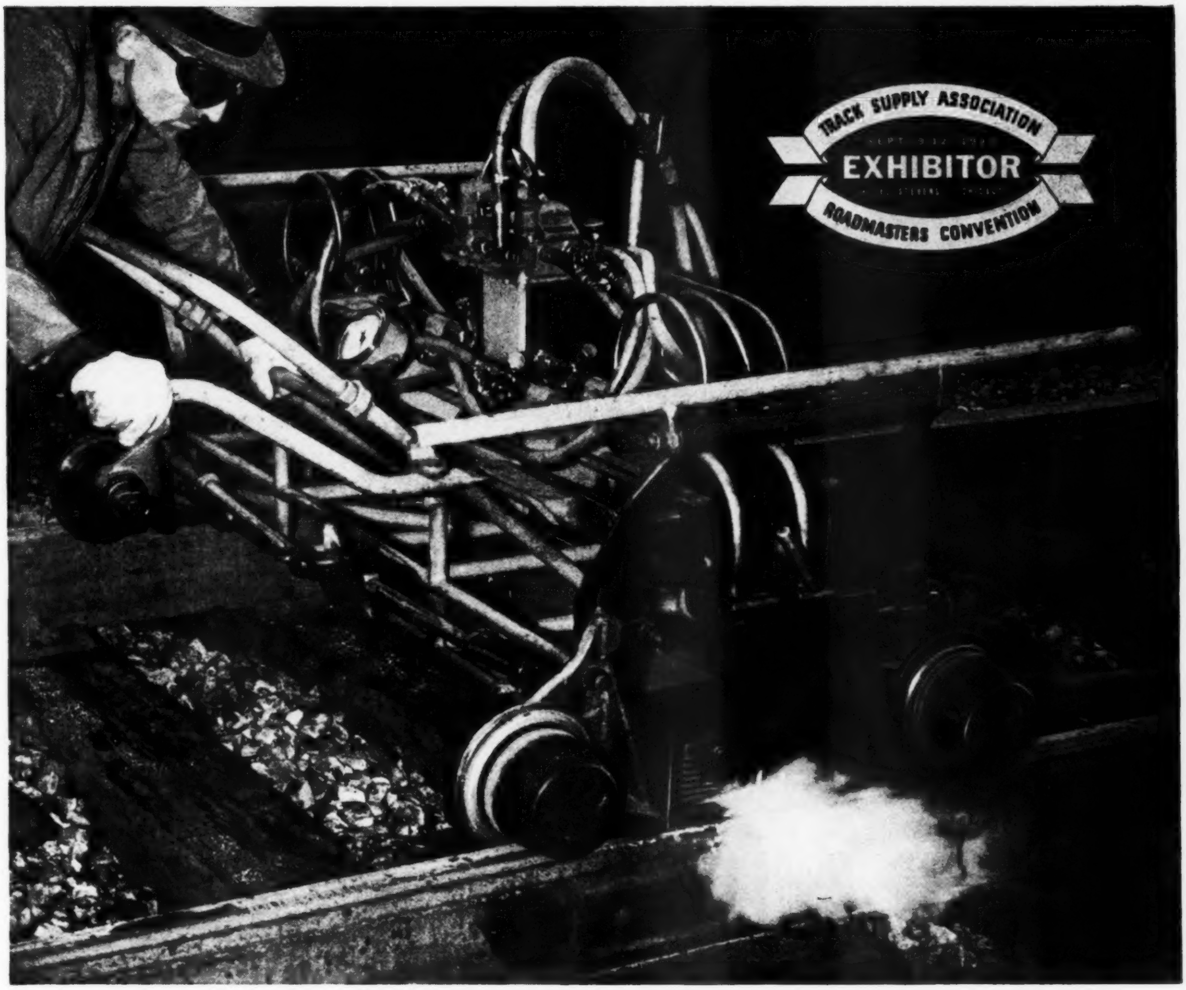
Yours sincerely,

Elmer T. Howson

Editor

ETH:EW

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.



End Harden Rail in Track
BY THE OXWELD METHOD

• The Oxweld method provides an economical and efficient means of end-hardening rail in track. This method produces a batter-resistant rail end of uniform hardness adequate for the rail service requirements. The work can be performed in track at low cost and without interrupting traffic. The Oxweld equipment for end-hardening rail is kept up-to-date and efficient in order that Oxweld may provide the best possible service for American railroads.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building   Chicago and New York

OXWELD RAILROAD SERVICE

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

AUGUST, 1940

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Railway Engineering and Maintenance

Safety

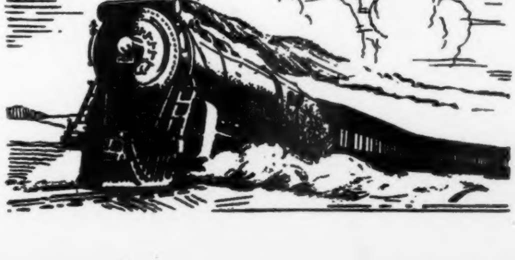
Railways Excel All Other Agencies

IN the five years, 1905 to 1909, inclusive, the number of passengers killed per one billion passengers carried one mile was 15.85. In the five years ending with 1914, this figure was reduced to 8.8; in the five years ending with 1919, it was reduced still further to 7.5; in the five years ending with 1924, to 4.7; in the five years ending with 1929, to 3.6; in the five years ending with 1934, to 2.25; and in the five years ending with 1939, to 2.05. The reduction from 15.85 in the five years ending with 1909 to 2.05 in the five years ending with 1939 was a decrease, in proportion to the volume of passenger traffic handled, of 87 per cent. And in the year 1939, when they carried more than 450 million passengers a distance of more than 22½ billion miles, the number of passengers killed fell to 1.19 per billion passenger miles, the lowest in the history of the railways.

Travel 1,600 Years Before Accident

Expressed in another way, during the last five years all passengers were carried almost 500 million miles for each one killed. Therefore, the average passenger could count upon traveling 60 miles per hour for about 930 years before meeting with a fatal accident. And on the basis of the record for 1939, he could travel nearly 1,600 years before meeting with a fatal accident.

No other agency of transportation can show a safety record approaching this. There is probably no other place on earth where it is as safe to be as on an American railway passenger train. In fact, a person is safer on a railway train than off one. This is proved by the fact that in 1939 there were an average of 73,000 persons on passenger trains each hour of each day of the year. With only 27 passengers killed in that year, the accident death rate was 3.7 per 10,000 passengers. In contrast, according to statistics of the National Safety Council, the accident death rate in the United States for 1939 was 7.1 per 10,000 inhabitants. In other words, a comparison of these two death ratios shows that a person ran nearly twice as great a risk of meeting death in 1939 when *not* riding on a train as when he was actually traveling on one.



Employees Work 2000 Years Before Accident

An equally outstanding record was made in the reduction in accidents to railway employees. In the five years, 1905 to 1909, inclusive, 23.7 employees were killed for each 10,000 persons employed. In the five years ending with 1914, this figure was reduced to 20; in the five years ending with 1919, the figure was still further reduced to 15.5; in the five years ending with 1924, it had declined to 10; in the five years ending with 1929, to 8.6; in the five years ending with 1934, to 5.6; and in the five years ending with 1939, it was 5.8. Within these 30 years, the danger of a fatal accident in railway employment was thus reduced 75.5 per cent. And in 1939 this ratio dropped still further to 5.1 employees killed for each 10,000 persons employed, which means that the fatalities to railway employees on duty was reduced to 1 for each 5,000,000 hr. worked. Since the average railway employee worked approximately 2,500 hr. in 1939, this means that, on the average, an employee would work 2,000 years before being killed.

This is a record in which every railway employee can justly take pride, both because of the achievement itself and because of the fact that he helped establish it. It is a record unique in industry—a record which other industries within as well as without the transportation field are endeavoring to emulate. It is a record which reflects the efficiency with which the railway industry is functioning—for in the same period the average number of cars per freight train and the average speed of freight trains, to pick only two indices, were both increased about 70 per cent. Other indices show like improvement.

One can offer no more convincing evidence of the progressive spirit that characterizes railway industry than the record made in promoting safety of patron and employee alike. This record warrants dissemination by every employee in order that the public at large may know and appreciate what has been accomplished — and doing so may gain an enlarged realization of the

character of the service that is being rendered by the railways—a service that all-too-frequently is accepted by the public as a matter of course, without realizing that such records "don't just happen" but are the result of definite planning and execution.

High-Speed Turnouts

Demand Increased Attention to Keep Pace

THE marked increase in the speeds of passenger and freight trains is focusing attention upon the design, construction and maintenance of turnouts to a greater extent than ever before. Only a few years ago, the restriction of speeds to 20 to 25 m.p.h. through turnouts was not considered serious on most roads, even for the fastest scheduled trains, whereas today such restrictions are viewed with serious concern, if not considered intolerable.

This change in operating requirements is emphasized in the paper by B. R. Kulp, chief engineer of the Chicago & North Western, that is published on following pages, in which the author not only directs attention to the growing seriousness of the speed-restricting influence of turnouts which only a few years ago were considered adequate, but also points out the difficult problems that must be faced and solved if this situation is to be overcome. Railway engineers and the manufacturers of special trackwork have not been blind to the growing demand for a "faster" track structure but have already made marked advances in turnout design and construction in recent years. However, when turnouts of even the most up-to-date designs require the restriction of speeds to approximately 40 m.p.h. for facing-point movements and to 50 to 60 m.p.h. for trailing-point movements, it is obvious, as pointed out by Mr. Kulp, that the problem has not yet been completely solved, and that even so-called modern turnouts still constitute bottlenecks at many locations in the routes of trains scheduled at operating speeds of 80 to 100 m.p.h. Where this condition exists, it constitutes just as effective a restriction of speed as sharp curvature or unstable track and, as such, demands the further attention of both railway men and trackwork manufacturers, to eliminate or still further reduce this handicap.

Obviously, the most important features in restricting speeds through turnouts are the diverging angle of the switch point and the degree of curvature of the turnout rails, although high-speed operation requires refinements in and the strengthening of many of the other features of turnout construction. In the development of No. 20 turnouts and long curved switch points, the transition in alinement at the point of switch has been flattened out and the degree of curvature between the point of switch and the toe of frog reduced, but even these improvements do not permit facing-point movements at speeds much above 40 m.p.h.

To permit still further increases in the permissible speeds through turnouts, it seems desirable that further consideration be given to the steps that have already been taken both in this country and abroad to reduce the rate of transition at the switch point and through the turnout, such as the use of longer leads and frogs of smaller angles, the more extensive use of split-angle turnouts wherein one-half of the switch and frog angles is taken up in each track, the introduction of superelevation in the high side of the turnout curve, curved frogs in some locations, and the general strengthening of turnout rails and fastenings to minimize abrasion and wear and the tendency of high-speed movements to throw the track out of alinement. With the exception of the latter considerations, all of these possibilities for increasing still further the permissible speed through turnouts present serious problems, the solution of which will require a high degree of resourcefulness on the part of both railway men and trackwork manufacturers and the closest co-operation between them. However, difficult as these problems may be, it is not too much to expect that they will be solved in the near future.

In the meantime, it is self-evident that where high-speed train schedules are maintained, the greatest advantage should be taken of the developments that have already taken place in turnout construction in the way of longer curved switch points, small angle frogs, and advanced designs in turnout fastenings, such as gage and slide plates, adjustable braces, fillers, guard rails and anchoring devices, to permit the greatest speeds possible with comfort and safety. As stressed by Mr. Kulp, it is equally important that turnouts in high-speed territory be supported on sound ties of suitable length and cross section, properly spaced; that they be afforded adequate ballast and subdrainage where necessary; and that they, as well as the track approaching them, be kept in perfect alinement, gage and surface, and be securely anchored. These details are of major importance because it is well known that if they are neglected they not only add noticeably to the discomfort which may be experienced in traversing a turnout, but also cause unnecessarily rapid wear of the switch point and fastenings, and damaging shock to the entire turnout assembly.

Surfacing—

How Many Tie Faces Should Be Tamped

WHEN surfacing track out-of-face, especially with power tie tampers, should all ties be tamped to a uniform bearing, or should the joint ties be tamped more solidly? This question, old as it is, is, judging from present widely varying practices, still unanswered to the satisfaction of many maintenance men. In fact, it is more than likely that there is no single answer that will fit all conditions of track and traffic.

The practice followed most generally in the past by those roads employing power tampers has been to tamp along all eight faces of all ties, employing the tamping tools in pairs, both outside and inside the rail, although there have been many deviations from this practice, one of which is to tamp the ties directly beneath each rail joint more solidly than those between joints, while not cocking the joints or otherwise disturbing the level of the track. One method being used to accomplish this difference is to tamp along all four faces at the ends of the joint and shoulder ties, two inside the rail and two outside, while tamping along only three faces of the ends

of all intermediate ties, in this case tamping along both faces outside the rail and along only the leaving face inside the rail. The theory behind this practice takes into account the recognized fact that the joint ties receive the greatest pounding under traffic and have a tendency to go down faster, resulting in low joints, and is obviously to build into the track, while surfacing, a relatively stronger condition at these points of weakness than prevails elsewhere. At the same time it is contended that the six-face tamping of the intermediate ties brings about a more satisfactory bearing condition beneath these ties. In this latter regard, with less resistance to the movement of the ballast outward from beneath the ends of the ties than inward from the rail, it is felt that single-face tamping inside the rail sets up a better balanced condition of support as settlement occurs under traffic, with less possibility of center-bound track.

Those who are employing this method of surfacing expect slightly greater settlement of the track between joints than is encountered where eight-face tamping throughout is practiced. In fact, this slightly increased settlement is the end sought through the use of the method, to help compensate for the greater settlement that can be expected at joints—thus bringing about a more uniform track surface generally.

While maintenance men have given much consideration to surfacing methods in the past, it is possible that those not thoroughly satisfied that the methods they are using are the most satisfactory and economical possible under their specific conditions, will want to ponder further the facts which have been pointed out.

Work Equipment

Three Trends Now Clearly in Evidence

DESPITE the large purchases of work equipment that have been made this year, not a few maintenance officers are already beginning to study their needs for next year and are going over the lists of power machines and tools they now have to determine what replacements will be required and what additions should be made. From information given by a number of these officers, the continuation of three trends can be traced.

The first of these is the growing use of off-track equipment for all types of machines that do not, by the nature of the work for which they are designed, require rail mountings. In large part this has been brought about by the demands of train and engine-service employees that they be assigned to all units of rail-bound work equipment that cannot be removed from the track readily. This trend has been stimulated also by the faster schedules that are being made effective for both passenger and freight trains, and the increasingly serious view that is being taken of any interference with these schedules.

The second of these trends is the increasing purchases of earth-moving equipment. In general, except for the relatively few units of this equipment that have been purchased during the last four or five years, the earth-moving equipment owned by the railways is badly out of date. Probably in no other class of work equipment are the railways so deficient today, or so greatly in need for immediate use. The growing tendency to purchase such equipment has been noted from time to time, so that the only really surprising element is the large number of units, including the entire range of machines now available for this purpose, that have been purchased this year and are in contemplation.

Maintenance officers have come rapidly to a realization that they can no longer afford to allow an operation to be done by hand if a satisfactory machine is available to do it. The railways have been slow to comprehend the economic value of small portable power-driven tools, but experience has demonstrated this value, so that the third of the trends that is noted is the increase in purchases of tools of this type for bridge and building work.

Hot Weather

A Poor Time to Renew Ties

THE long-continued and severe heat wave that began about July 20 brings to mind the rule to which many old-time track foremen worked. As soon as the frost was out of the ground sufficiently to permit, they went over their sections, smoothing the surface and lining the track. By the time they had finished this operation, they began to renew ties and, unless they were hampered by monthly allotments, which were not then common, or by sudden orders to reduce forces, for the next two or three months they had few other objectives than that of getting as many ties in the track as the size of the force would allow, and interruptions to do other work were resented.

They worked on the theory that a man can do more effective work—in this instance, insert more ties—with the same effort, when temperatures are moderate and the ballast is moist and loose, than is possible when the weather is hot and the ballast is completely dried out and settled compactly. Furthermore, as was commonly said, one does not have to worry in the fall about inserting a tie that was inserted last spring. One thing that was constantly in their minds was the danger of buckling where the track was opened for tie renewals during hot weather, since the light rail then in use had relatively little stiffness of itself and but little lateral reinforcement, except that provided by the ballast shoulder and full cribs.

Today, conditions are greatly changed. Instead of large section gangs we have mere skeleton organizations; rail is heavier and stiffer and is given material aid in lateral stiffness by double-shoulder tie plates and superior joint fastenings; preservative treatment has reduced tie renewals to around 100 or less to the mile, compared with 300 to 600 when ties were not treated. Yet the track will buckle as in former years if it is opened when the rail is hot and is tight from expansion or creepage; men still do better work in moderate temperatures; and the old adage that it is unnecessary to insert a tie in the fall that has been inserted in the spring is still valid. In other words, the desirability of completing tie renewals prior to the hot period, say by July 1, has not changed with the other changes that have occurred in track maintenance during the relatively short period covered by the last two decades.

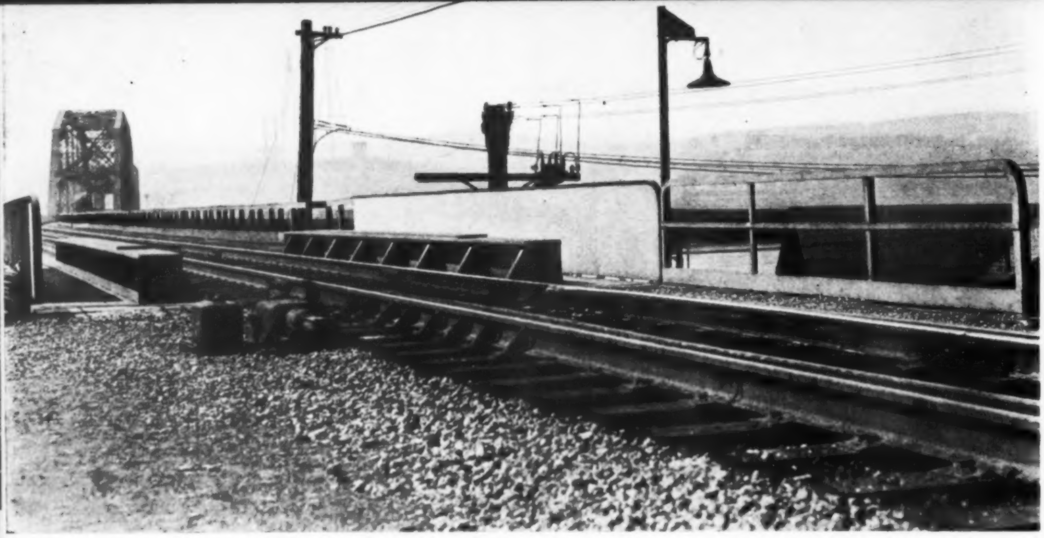


Fig. 1—Looking South Over the Completed Deck of the Pre-Fabricated, Electric Welded Structure

Welded Girder Bridge Set in Five Hours

Company forces of the Union Railroad fabricated a new structure, made up largely of wide-flange beams, in the shop; transported it to site of erection on gondola car and set it in place with a crane, replacing an old skew, plate girder, grade separation span. They also made unusual alterations in the old column and abutment supports, using 1,704 lb. of arc welding rods

By FLOYD R. SMITH

Chief Draftsman, Union Railroad, East Pittsburgh, Pa.

CONFRONTED with the problem of replacing an old single-track through girder bridge span in a congested location near Pittsburgh, Pa., with a minimum of interference with traffic, the Union Railroad worked out a procedure which proved highly effective and which, incidentally, involved the complete prior fabrication of the new structure, largely by electric arc welding. Traffic was interfered with only at one time, while removing the old span and setting in the new one with a crane, and this extended over only five hours.

The structure involved was located in a bottle-neck section of main track at the north end of the viaduct approach to the road's bridge over the Monongahela river, about 11½ miles upstream from Pittsburgh, and extended over High street on a skew of 68 deg. The span consisted of two 48-in. plate girders on 13-ft. centers, one of them being 38 ft. 10 in. long and the other 35 ft. 6 in. long. These girders carried a typical trough-type deck, with the ties partially housed in the troughs so that the top of rail was only 2 ft. 2 in. above the bottom flange of the plate girders.

Old Substructure

The structure as a whole was supported at its north end by an old stone masonry abutment, located parallel with the center line of the street, the girders resting on ½-in. steel bearing plates, while at its south end they were supported on built-up columns, the line between which was at right angles to the track. These columns, which were carried on stone footings and tied together by diagonal bracing, also supported the adjoining deck plate girder span of the river bridge approach by means of a heavy cross girder extending between them. In addition to the end supports of the street span, the girders were further supported just beyond the south edge of the street pavement by a pair of unbraced intermediate steel columns, the line of these columns lying at an angle with the south end bent and parallel with the street center line.

Plan Adopted

The plan for replacing the street span called for a new span 38 ft. long, with square ends and without the intermediate support along the south side of the street. It also called for the lowering and renewal of the old masonry bridge seat at the north end, while at the same time squaring it up to give support for the new square-end span. In this latter work, the first two 18-in. courses of abutment stones were removed and replaced with 18-in. steel shoes and an 18-in. pad of reinforced concrete, the pad extending backward to a new concrete backwall at right angles to the track. This new arrangement was made with the realization that it would afford a better backing for the approach fill, thereby lessening track maintenance, and at the same time improve the condition of the bridge seat, simplifying the inspection and maintenance of the structure.

With these changes in the abutment in mind, the first step in the

work was to construct a temporary timber bent two feet from the face of the abutment, to give support to the ends of the girders and also to temporary stringers to be extended back into the approach fill to carry the track and traffic over the area involved in the abutment change work. To provide space for these stringers, the temporary bent was constructed with the top of its cap 18 in. below the undersides of the troughs of the old span, and the girders themselves were given support on the cap through such timber blocking as was required. Before the girders were brought to bear upon the bent, ample additional web stiffeners were provided above the points of bearing to prevent the possibility of buckling, these web stiffeners being secured in place by welding.

Columns Strengthened

Because of the planned removal of the intermediate supporting columns in the new arrangement, with the increased load which this would put on the south end columns, an arrangement for strengthening these columns was devised. In this, the original column section, consisting of two heavy channels tied together by lacing bars, was increased by the addition of two 5-in. by 5-in. by ¾-in. angles to the span-side face, with their attached legs turned outward, away from each other. To afford an even continuous bearing for the angles, the base angle on the span side of each column, and all of the lacing on this side, were removed. Then, a stay plate, of the same thickness as the bottom bracing gusset which was not removed, was attached to the span-side flanges of the channels of each column. The new strengthening angles were milled at the bottom to insure positive bearing on the sole, or base plates and were secured in place by riveting to the flanges of the column channels. Following the riveting, both the strengthening angles and the gusset connection angles on the span side of the columns were welded to the sole plates by means of ½-in. fillet welds.

Because of the deteriorated condition of the footing masonry plate of one of the columns, it was replaced with a new plate 1¼ in. thick. This work was done between trains by raising the column with jacks, burning off the old anchor bolts flush with the top of the stone footing, sliding out the old plate, and then sliding in the new plate. Following these operations, the column sole plate was welded completely around its perimeter to the new footing plate by means of a ½-in. fillet weld, and was fastened to the foundation stone by new anchor bolts which were set in newly drilled holes.

Wide-Flange Beam Girders

A careful study of the most desirable type of new span to be used at the crossing led to the adoption of the two-girder design, with closely-spaced floorbeams and short stringers to give direct support to standard wood crossties. In this design it was found that an extensive use of welding, besides being conducive to simplicity and economy in construction and erection, made possible certain desirable connections that would otherwise have been impractical, and perhaps impossible. A study of the most economical type of girders to be employed, which were to be spaced 13 ft. center to center, led to the selection of 36-in., 300-lb. wide-flange beams, each 39 ft. 9 in. long, and each fitted with two cover plates, one top and one bottom, 14½ in. by 1¼ in., by 26 ft. long, attached to the beams by ⅜-in. full fillet welds. This design, it was determined, would satisfy Cooper's E-72 loading with an allowance of 87 per cent for impact, including dead weight. Twenty-two 12-in., 79-lb. wide-flange floorbeams were framed into these side girders on centers of 1 ft. 9 ⅝ in., set directly on the bottom flanges of the girders. In selecting the floorbeams, it was assumed that the maximum possible load each beam could carry was a total of 70,000 lb., which allowed for four stringers, each with a maximum load of 17,500 lb.

The stringers selected were 8-in., 23-lb. I-beams, which were set on the bottom flanges of the floorbeams and framed into them in pairs on 1-ft. 6-in. centers beneath the center line of each track rail. To provide a broad seat for the standard crossties which were to be recessed between the floorbeams, each pair of stringers, between floorbeams, was covered with a 9½-in. by ¾-in. by 1-ft. 10-in. bearing plate, tack-welded in place.

The flooring of the deck outside of the limits of the ties consists of sections of steel plate 26-in. by ⅜-in. by 4-ft. 10-in., welded to the tops of the floorbeams. To provide broad stops against which the track ties can thrust laterally, 2-in. by 2-in. by ½-in. angles, 9½-in. long, were welded to the floor plates at both ends of each tie recess in the deck. When the track was laid, alternate ties were made to bear tightly against these tie stops on opposite ends. As girder stiffeners, eight brackets, on centers of 5-ft. 4⅞-in., were attached to the web and top flange of each girder and to the tops of the floorbeams, these brackets being made of ½-in. plates and being secured throughout by means of ½-in. fillet welds.

Special Bearing Brackets

Other special features of the span include the provision of vertical end plates on each girder, welded in place, and of special bearing brackets beneath the south ends of the girders where they rest on their column supports. These special brackets, which are shown in Fig. 4, were cut from 36-in., 300-lb., wide-flange beams, and were provided with 1-in. plate web stiffeners, welded into position. The

Fig. 2—The New Span, on the Re-Capped Columns at the South End, and the Re-Capped and Remodeled Abutment at the North End

brackets themselves were attached to the girders by means of 3/4-in. fillet welds.

To the bottom of each bracket a 20-in. by 3-in. by 1-ft. 6 1/2-in. bearing plate was welded, fitted on its underside with lateral guide plates designed to guide for longitudinal movement only a 6-in. by 1 1/2-in. by 1-ft. crown bearing plate attached to the top of the column cap plate. The crown bearing plate was pre-welded to the column cap plate, which was set in place after the old span had been removed and the column had been cut to the correct height and ground to afford a true and smooth top bearing surface. As noted in Fig. 2 and 4, two end bearing stiffeners, each consisting of 7-in. by 1 1/4-in. by 2-ft. 9 3/8-in. sections of plate, cut to bear, were attached to the girders at each point of bearing by means of 3/4-in. fillet welds. As noted in Fig. 2 also, a lateral strut, consisting of an 18-in., 58-lb. channel, was extended between the girder support brackets on opposite columns, to which it was fixed by fillet welds.

Special Masonry Shoes

At the opposite end of the new span, crown bearing plates, 10-in. by 2 1/2-in. by 1-ft. 2-in., were fillet-welded to the bottoms of the girders at the bearing points of the three masonry shoes supporting the span on the new 18-in. reinforced concrete bridge seat. Beneath the west girder there is only one masonry shoe, which rests directly over the old stone abutment, while beneath the east girder there are two masonry shoes, one bearing directly over the abutment, and the other having bearing 5 ft. 4 7/8-in. further to the north under the new arrangement adopted for a square-end bridge and extension of the abutment masonry backward to provide a new end support. These three fixed-end masonry shoes were built from 10-in., 136-lb. wide-flange beams, with their ends cut on a 1:2 slope, and each is provided with three web stiffeners cut from 1-in. plate, held in place by means of 1/2-in. fillet welds. The beam and web stiffeners forming each shoe are welded to 20-in. by 3 1/2-in. by 2-ft. 4-in. bearing plates, and each bearing plate, in turn, is fixed to the masonry by means of four 1 1/2-in. bolts set in 2-in. precast holes. Each shoe is fastened to its girder by means of four 1 1/4-in. bolts.

Fig. 3 — Close-Up of the New Deck, Showing Features of the Main Girder Construction

Sidewalk Details

For the safety of those who must walk across this bridge, sidewalks were provided along both sides, cantilevered from the main girders, the feature of these sidewalks being that they are of welded construction practically throughout. The supports of the sidewalks consist of 12-in., 30-lb. channels, 3-ft. 8 1/2-in. long, while the railing posts, upright from the ends of the supports, are made up of sections of 3/4-in. plate, 3 1/2-in. wide and 4-ft. 7 1/2-in. high, which were welded in position. Enclosure of the railing is by sections of 1/4-in. plate, surmounted by a handrail made from 3/8-in. plate 3-in. wide. To permit ready drainage and self-cleaning of the sidewalks, the railing enclosure plates were set 1-in. above the floor plates. Tack welding was employed throughout to hold the posts, plates and handrails in place.

The flooring of the sidewalks consists of sections of 1/2-in. Multigrip floor plates, welded to the channel brackets and to each other with 1/4-in. bead welds. To reduce deflection in these plates under load after a period of deterioration, two 1/2-in. stiffener plates, 4-in. wide, were spot-welded edgewise beneath each of them. As a toe guard on the girder side of each walkway, a 1/2-in. plate, 4-in wide, was fillet-welded to the girder brackets in an upright position, space being allowed between it and the floor plates to permit ready drainage and self-cleaning of any dirt or soot that might otherwise tend to collect.

By far the most complicated part of the bridge renewal project was the economical conversion, under heavy traffic, of the skewed masonry abutment at the north end to one affording a square-end bearing, and, at the same time, the provision of a masonry backwall, which did not exist previously. To effect these changes, the procedure adopted first called for the placing of two concrete bearing blocks, one on each side of the track, clear of the excavation to be made directly beneath the track. These blocks were designed to afford indirect support for temporary stringers to carry the track during subsequent excavation, and to be used ultimately as the main supports for the new backwall. In addition, they also afforded support for the outriggers of the crane which later removed the old span and set the new span in place.

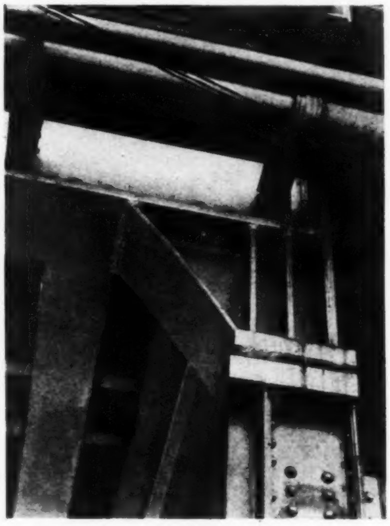


Fig. 4—Close-Up View of One of the Girder Support Brackets at the South End, Showing Details of Its Welded Construction

Altering the Abutment

The concrete block installed on the east side of the track, which had a bearing area of 65 sq. ft., was poured in place on the well-consolidated fill back of the old abutment, the nearest edge of the block being 5-ft. 3-in. from the center of the track. This block was reinforced with four 130-lb. rails. Owing to difficulty presented in providing shoring for the construction of the bearing block on the west side of the track, this block was precast and then set in place on a thin layer of grout by the company's wrecking crane. Four lengths of 130-lb. rail were encased in this block and were left protruding 4 ft. on the end facing the old abutment so that they could be given support on the old abutment stones. The primary purpose of this arrangement was to pre-

vent overturning of the block when the rails were used subsequently to support the new backwall, which, in turn, when in a partially completed stage, was made to carry the track on temporary stringers spanning the old abutment area.

Employing auxiliary rail supports lashed to the tops of the track ties, the next stage in the work of remodeling the abutment involved excavating for the new backwall and then the construction of this wall on the two bearing blocks to a height of 3-ft. 9-in. from the top of rail. This lower part of the backwall was made up of a rib of concrete 2-ft. 8-in. wide, encasing two 16-in. 96-lb. wide-flange beams, resting on the bearing blocks and having support between them on the earth fill. Following the development of sufficient strength in the concrete of the partially completed backwall, a series of temporary I-beam stringers were installed beneath the track, with support on the backwall and on the temporary timber bent which was erected immediately ahead of the abutment face.

With the track thus supported, it was relatively easy to perform the necessary work of repairing and extending the old abutment. In this work, the first two courses of stone, to a depth of 36 in., were broken up and removed. These were then replaced with a well reinforced concrete pad 18 in. thick, which was extended backward to the backwall section already completed.

Through the use of high-early-strength cement which produced a slag concrete having a three-day strength of 5700 lb. per sq. in. under steam curing, it was possible to transfer the stringer loads to the new bridge seat pad three days after it was poured. This was done by first blocking up beneath the stringers and then burning off their ends which extended within the new backwall area. When this condition was set up, and with the auxiliary rail supports carrying the track directly over the new backwall excavation, the remainder of the backwall was completed, as well as a wing section at its east end, without interference with traffic.

Placing the New Span

While all these field operations were under way, the new girder span was being fabricated and assembled in the car shop of the road at Duquesne, Pa. At an appointed time, the completed structure, except for its sidewalks, was loaded on a gondola car by means of the road's wrecking crane and one of the overhead car shop cranes, and was transported to the site of erection where it was held overnight on a near-by track. At 8 o'clock the following morning, a 60-ton crane with a 50-ft. boom was spotted directly behind the new backwall, with the gondola car carrying the new span directly behind or north of it, and the crane was made ready to lift out the old span and to set in place the new span as a unit.

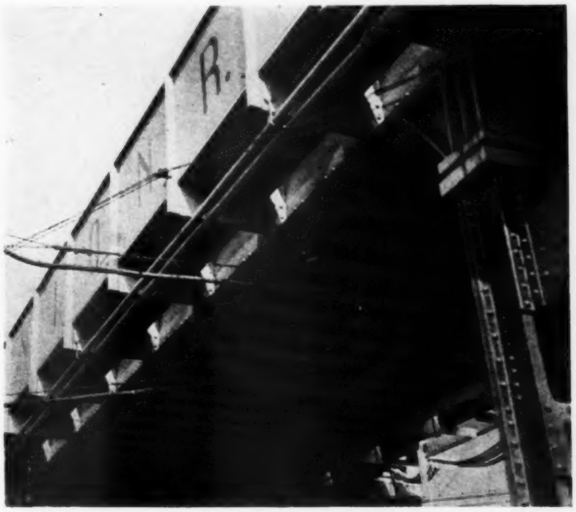


Fig. 5 — Looking Up Under the New Span, Showing Features of the Welded Deck and Sidewalk Construction

Careful Preparations

Before the old span was removed and the column supports at its south end cut off, as referred to earlier, it was necessary to remove a high signal mast just north and east of the bridge to permit the swinging of the crane boom. When this had been done and the track had been cut, the old span, which had been prepared previously for removal by stripping off its sidewalks, shoring air lines located on its west side, and supporting both a water line and signal cables on its east side, was lifted as a unit by the crane and swung to a point of rest on the embankment slope east of the crossing. With the old span out of the way, and while the south end support columns were being dressed down to a true surface by means of power grinders and fitted with their new prefabricated bearing plates, the crane removed the temporary stringers that had supported the old span at the south end and also the two columns which had given intermediate support to the old span just south of the street roadway. With this work completed, the new span was lifted from the gondola car by the crane and swung around to a point directly over its final position, where, guided by drift pins in the fixed masonry shoes, it was lowered into exact position at the first setting, without the necessity for further adjustment. While the finishing-up work was being completed, which involved essentially the resetting of the signal mast, the bolting of the three masonry shoes, and the fillet-welding of the columns to the new column caps, the track over the bridge was assembled and connected up at both ends, this being completed at 1 p.m., five hours after the old bridge had been taken out of service.

The sidewalks on both sides of the bridge were field-erected, with no interference to traffic. Shop-welded units of one-half the span length were lifted into position, one at a time, by a 15-ton crane, and were subsequently welded together. Later, the air line on the west side of the bridge and the water line and signal cables on the east side were restored to position.

The new span described was designed by the engineering department of the Union Railroad, under the direction of D. E. Woozley, chief engineer, and A. L. Lee, engineer of bridges, and was fabricated and assembled at the road's car shop, except for the partial assembly of the sidewalks. All of the masonry and span erection work was carried out by company forces.

Welding Records

Records of the work show that the new superstructure, including its weld metal, weighs 88,770 lb., and that the total weight of the welding rods used in fabrication amounted to 1,704 lb. Seventy man-hours of field welding and 650 man-hours of shop welding were required in the fabrication and erection work, this indicating the application of the weld metal at the rate of 2.37 lb. per man-hour. All of the welding in both the shop and field was done with Wilson No. 98 shielded-arc electrodes.

All Main-Line Curves of 3 Deg. or More on the C. & O. Now Have the Benefits of Lubrication

Getting More Service

During recent years the effective range of curve lubricators has been lengthened as a result of the development of improved practices, and to capitalize on this fact the Chesapeake & Ohio has respaced its lubricators on a system-wide basis. This article reviews the history of curve lubrication on the C. & O., outlines the basis on which the relocation program was carried out and shows how it has affected the distribution of lubricators on the road

TAKING advantage of the greater knowledge that has become available of late concerning the performance of curve lubricators, the Chesapeake & Ohio completed the relocation of its rail and flange lubricators on a system-wide basis during 1938-39. As a consequence, without increasing the number of machines, the benefits of lubrication have been extended to practically all main-line curves of 3 deg. or more, while at the same time it was possible to release from main-line service a considerable number of units, most of which were installed on branch lines that had not previously had the advantages of curve lubrication.

Since the C. & O. is predominantly a coal carrier, considerable of its traffic is composed of heavy-tonnage trains and, because of the effects of this type of traffic on curves and the impracticability of super-elevating curves to satisfy the requirements of both this slow-speed traffic and high-speed passenger trains, rail wear and other curve troubles formerly presented a serious problem. Because of this situation this company was quick to recognize the advantages of curve lubrication and as early as about 1925 it was installing mechanical curve lubricators in its tracks, the machines then used being of a home-made type that employed oil as the lubricant.

However, automatic curve lubrication on a wide scale was not undertaken until about 1931, when the company began to acquire lubricators of the type that utilizes grease lubricants. At first only those curves which were proving the most troublesome were lubricated but, as the railroad became more thoroughly convinced of the savings in transportation as well as maintenance costs that could be effected through the installation of curve lubricators, it began to broaden the basis of their application and to install them in increasing numbers. As a result, by the end of 1937 it had 348 machines in service.

Early in 1938 the railroad undertook a study of its track lubricator installations on a system-wide scale, and then set about relocating its lubricators in accordance with a new policy based on the increased effectiveness that could be expected from the machines. As the basis for relocating the lubricators in double-track territory, the premise was established that each machine would effectively grease the high rails on about 5,000 ft. of curves of 3 deg. or more, extending in general over about five miles of track.

Generally speaking, the amount of tangent between curves to be lubricated by the same machine was not considered to be a factor of much importance in causing loss of grease from wheels, although some attention was given to the influence in this regard of curves less than 3 deg. However, in the final analysis the amount of tangent track and light curves permissible in the stretch of track lubricated by any one machine was based largely on a study of local conditions.

In Single-Track Territory

In respacing lubricators in single-track territory, it was considered that each machine was capable of greasing adequately about 3,500 ft. of high rail in each direction, or a total of approximately 7,000 ft. of high rail. Tangent track and curves less than 3 deg. were accorded the same consideration as in double-track territory. A particular effort was made during the respacing of the lubricators in single-track territory to locate them in pairs, the units in each pair being placed as closely together as local conditions would permit. The object of this policy is to make it possible for the road mechanic to service the two machines during the same stop, thereby saving his time and reducing maintenance costs. This policy also permits a reduction in the supply of grease kept on the line.

The curve lubricator relocation program of the C. & O. also involved a study of the requirements in yards

From Curve Lubricators

This Lubricator, Which Is Typical of Many on the C. & O., Has Been In Service for More Than 10 Years

and terminals, as a result of which the policy in regard to such locations has likewise been revamped. Previously, it had been the practice to install lubricators at various strategic points in yards, such as at the entrances to ladder tracks and in the lead or hump tracks of classification yards. Now, as a general rule, it is considered unnecessary on the C. & O. to install lubricators in yards, the theory being that machines placed in running tracks near the limits of each yard or terminal area will provide effective lubrication throughout the yard. At such locations the machines are placed in pairs in order to provide lubrication for both rails.

In carrying out the relocation program, the new positions of the lubricators were first determined in the office of the engineer maintenance of way by reference to track charts. Instructions for relocating the machines were then transmitted to the respective division engineers under whom the actual work was done by regular road mechanics. In some instances the locations of the lubricators, as determined in the office of the engineer maintenance of way, were altered somewhat by agreement with the division engineer in order to give consideration to various local conditions.

Effects of Program

The effect of the relocation program on the distribution of lubricators on main-line districts has been to decrease the number in some territories and to increase the number in others. On the Richmond division, for instance, the number of lubricators on the Rivanna sub-division, which extends between Richmond, Va., and Gladstone, 119 miles, was reduced from 34 to 25; on the Peninsula sub-division (Richmond to Newport News, Va., including the terminal at Newport News) the number was reduced from 13 to 8; while on the Piedmont sub-division, which extends between Richmond and Charlottesville, Va., 97 miles, where previously no machines were in service, 8 units were installed as part of the redistribution program.

On the Clifton Forge division the total number of lubricators in service on main-line sub-divisions was reduced from 86 to 82, although two of the three sub-divisions showed increases. Thus on the double-track Alleghany sub-division, which extends between Clifton Forge, Va., and Hinton, W. Va., 78 miles, the number of units was increased from 38 to 41, and on the Mountain sub-division, which includes the single-track territory between Charlottesville and Clifton Forge, 96 miles, the increase was from 11 to 14. On the other hand, when the respacing of lubricators on the James River sub-division, also single track, had been completed, it was found that the number of units there had been reduced from 37 to 27. This sub-division comprises the territory between Gladstone and Clifton Forge, 112 miles.

Likewise, on the Hinton division the number of lubricators on main-line districts was reduced from 42 to 37; on the Cincinnati division from 27 to 18; on the Hocking division from 17 to 10; and on the Chicago division from 33 to 20, while there was a decrease of from 43 to 23 in the total number of units in service on the two main-line sub-divisions of the Huntington division.

On Branch Lines

As a net result of the redistribution program, 60 lubricators were released from service on main-line districts, of

(Continued on page 515)

Placing Many of the Machines in Pairs, Makes it Possible for the Road Mechanic to Service the Two Machines While Making Only One Stop

High-Speed Turnouts—

Design

Construction

Maintenance*

By B. R. KULP

Chief Engineer,
Chicago & North Western,
Chicago

The Symmetrical Turnout Layout, Where Conditions Permit Its Use, Is Highly Effective for High-Speed Movements

THE railroads of certain foreign countries have considered increased speed for many years and have provided track layouts at the junctions of many of the diverging routes of their high-speed trains to meet these conditions. In this regard, they have gone so far as to provide special appurtenances to permit putting superelevation in the curves of turnouts for smoother operation.

To a lesser degree, the railways of the United States have given consideration to these features for a number of years. However, more recently, through the necessity and importance of providing for faster movements through turnouts arising with the inauguration of high-speed steam and Diesel-operated trains within the last five years, they have been required to give serious attention to improving designs in order to provide turnouts through which trains may be operated safely and comfortably at high speeds. For the purpose of this discussion we can eliminate consideration of turnouts less than No. 20 as being definitely out of the picture for the reason that even the No. 20 turnout falls short of what is desired where high-speed operation is required.

Turnouts Are Bottlenecks

Considering the matter of speed only, present turnouts are real "bottlenecks," as in many locations they occur where the only speed restricting factor is the track alinement through them. The importance of this is evident when it is realized that under modern high-speed operation each 10 m.p.h. of additional deceleration means minutes lost in regaining normal speed—minutes that are hard to recover. In recognition of this fact and the growing demand for higher permissible speeds through turnouts, the Track committee of the American Railway Engineering Association inaugurated a study of this subject several years ago, with the result that curved switches, up to and including 39 ft. in length, have been designed and have been incorporated in the trackwork plans of the association as recommended practice.

Split-Angle Turnout Best

In our effort to solve this problem on the Chicago & North Western we have used the following arrangements: (1) A No. 20 turnout with straight switch points and with all of the curvature on one track, which is the ordinary arrangement and the least desirable; (2) a No. 20 turnout with a 30-ft. curved switch, which greatly reduces the striking angle at the point of switch and thus improves its riding qualities; (3) a No. 20 turnout with 30-ft. straight switch points, the turnout alinement being split so that one-half the switch and frog angles are taken up in each track, giving the effect of a 1 in 40 turnout. This latter arrangement has been used for many years on most roads and is by far the most desirable layout. Of

*A paper presented before the Maintenance of Way Club of Chicago.

course, it is not always practicable to secure such a layout because of lack of space or because of the expense involved in making the track changes necessary. However, we have found that the improved riding qualities, reduced maintenance, and extended life of the turnout material in this type of turnout more than justify the expense of any change in alinement required.

Curved Switches

In high-speed locations where a divided turnout arrangement cannot be used and the angle and curvature must all be in one track, I believe it is generally recognized that the turnout should be curved continuously from the point of switch to the toe of frog, for the following reasons: (1) To provide a lighter angle at the point of switch to minimize as much as possible the effect of deflecting wheels and equipment abruptly from a straight line; and (2) to reduce the turnout curvature so that the lack of superelevation will not affect the riding qualities through the turnout adversely. In this connection, it is noted that the 39-ft. curved switch adopted by the American Railway Engineering Association in March, 1937, when used in conjunction with a No. 20 turnout, has a 25-min. angle at the point, curvature of 1 deg. 45 min. through the switch proper, and curvature of 1 deg. 40 min. between the heel of switch and the toe of frog, taken on the center line of the track.

The author of this paper points out that in spite of the improvements that have been made in the design and construction of turnouts, the advent of high-speed trains in recent years has made them "bottlenecks", as regards speed, in many locations. "If any great improvement is to be hoped for in the way of developing turnouts for the higher train speeds of today," he says, "radical changes, tending to give greatly reduced switch angles and turnout curvatures will have to be made"

30-Ft. or 39-Ft. Switches

During the last six years the North Western has been installing No. 20 turnouts with 30-ft. curved switches in connection with rail renewals where high-speed train movements are required. The 30-ft. curved switch has an angle of 40 min. at the point of switch, curvature of 1 deg. 30 min. through the switch proper, and curvature of 1 deg. 32 min. from the heel of switch to the toe of frog. The switch point is planed to ⅛-in. thickness at the point on an angle of 78 deg. for the full length of the side planing, and the chamfer cut is eliminated. The curved point is of the Samson type, which is used in conjunction with an undercut stock rail. The opposite straight point is planed to fit against a stock rail which is bent and curved at the plant of the manufacturer to provide correct gage throughout the switch.

Special Points and Stock Rails

We have found that the Samson-type point and undercut stock rail add considerably to the life of the points. We have also found that the stock rails secured from the frog and switch manufacturer are superior to similar rails bent in the field. To secure the necessary accuracy of switch point fit and alinement, which is of prime importance in a switch installation, it is

Above—A Passenger Train Making a Facing Point Movement at 60 m.p.h. Through a No. 20 Split-Angle Turnout Equipped With Doubly-Reinforced, 39-Ft. Curved Switch Points

Many Turnouts on the London, Midland & Scottish, England, as Shown in the Illustration Below, Are Given Super-elevation to Improve Their Riding Qualities at High Speeds

imperative that the stock rail be bent to the exact heel spread dimension. I believe that everyone is familiar with the ragged appearance of a switch installation caused by an improperly bent stock rail.

To the present time we have not used the 39-ft. curved switch recommended by the A.R.E.A., mainly because the 30-ft. curved switches we are using have given very good results. However, it must be conceded that the 25-min. angle at the point of the 39-ft. switch is a very desirable feature which it is impossible to overlook because of the benefits to be found in the 15-min. lower angle. One undesirable feature of the 39-ft. switch is that it requires stock rails longer than the present rolling standard. The use of the 39-ft. switch also requires an auxiliary throwing device near the center of the switch, which we have not found necessary with the 30-ft. switch.

High-Speed Turnouts on the Electrified, New York-Washington Main Line of the Pennsylvania, at Newark, N. J.

Switch Angle Chief Factor

We have not experimented with installations where the frog angle is less than that of a No. 20, mainly because, as a general rule, the permissible speed through the turnout is governed more by the switch angle than by the curvature between the heel of switch and the toe of frog. For an angle of 25 min. at the point of switch and a closure curvature of 1 deg. 40 min., a speed of 40 m.p.h. in facing movements and of 50 m.p.h. in trailing movements will give comfortable riding. This is equivalent to approximately a 3-in. deficiency in the elevation of the closure curve. A higher trailing movement speed is permissible through the turnout because experience has shown that the impact at the point of switch is decidedly less in trailing movements than in facing movements.

To determine the type of frog best suited for high-speed turnouts, we have used ordinary open-hearth frogs, open-hearth, bevel-point, heat-treated frogs; and rail-bound manganese frogs. All three of these types have certain advantages, but as regards speed, the manganese type has the advantage of the same type of construction in both runs, while the open-hearth type, of necessity, has one wing which is weaker than the other because of the manner in which the frog is constructed. The rail-bound manganese type is probably the most desirable type and the most generally used for high speed turnouts.

Quality Construction Essential

It is highly important that the best recommended practice be followed in the fabrication and installation of high-speed turnouts. Sound ties of suitable length and cross section, and properly spaced, are of primary importance. Turnout material such as gage and slide plates, adjustable braces, fillers, etc., should be of proper design and of good quality to keep the turnout in excellent alinement and surface.

It should be quite evident also that all of the care used in the design and construction of the various component parts of the turnout will be nullified, at least to a certain extent, if sufficient attention is not given to installation details, such as gage, alinement and surface. Smooth riding turnouts will result only from correctly fabricated parts, properly installed.

The accuracy of the alinement through high-speed turnouts cannot be stressed too strongly. It is also of extreme importance to secure accurate alinement in the track approaching the switch. Because of the light angle at the switch point, slight errors in alinement may cause a very noticeable throw in entering the switch, and will cause rapid wear of the switch point.

Proper Maintenance Important

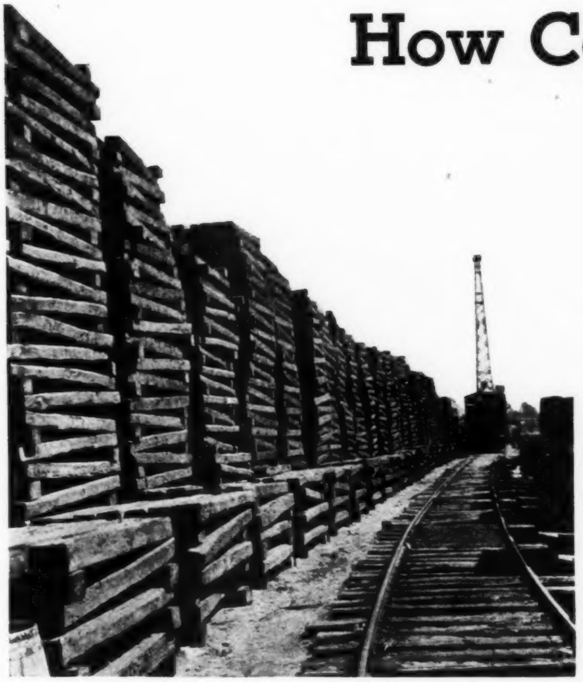
After a properly designed high-speed turnout has been installed on suitable ties and ballast, with great accuracy as to line and surface, it then becomes a matter of careful maintenance to preserve these favorable conditions. A high state of maintenance will be required to keep these turnouts in accurate alinement and surface, including the building up of the frogs and switch points by welding as necessary, because slight irregularities at such locations become very noticeable at high speeds.

Furthermore, we should be concerned about violations of speed restrictions through turnouts. Speed restrictions through turnouts should be given by signal indication if possible, and, if not possible, by timetable restrictions. It is of utmost importance that we have co-operation from the operating department to the end that these restrictions are not violated.

The railroads have been handicapped to a large extent in their high-speed track installations by the necessity for utilizing standard materials to avoid undue expense. If any great improvement is to be hoped for in the way of developing turnouts for higher speeds, radical changes tending to give greatly reduced switch angles and turnout curvatures will have to be made. Obviously, we are forced to proceed very cautiously in the design of new trackwork because of the large responsibility that is placed on us. However, in spite of the limitations imposed, I believe that the next few years will produce turnouts that will permit of much higher train speeds, safely and comfortably, than those which are allowed today.

A Group of No. 20 Turnouts in the Main Line of the Erie at Ridgewood Junction, N. J., Which Employ Sampson Switch Points and Rail-Bound Manganese Insert Frogs

Splits in Ties—How Can They Be Controlled?



The Free Circulation of Air About Ties While Seasoning Is of Prime Importance in Controlling Splitting

This is an abstract of a report presented at the March, 1940, convention of the American Railway Engineering Association by a subcommittee of the Committee on Ties. It discusses the causes of splits in ties and describes various measures that may be taken to overcome or minimize them. R. E. Butler, chief engineer, Newburgh & South Shore, was chairman of the subcommittee

SPLITS in ties are recognized by railroads as major reasons for renewals, especially since preservative treatment has practically eliminated decay. Hence, the various procedures that are followed in efforts to minimize them are worthy of careful consideration. A split is defined as a lengthwise separation of the wood extending from one surface through the tie to the opposite surface or to an adjoining surface.

No scientific study of tie shrinkage has come to the attention of the committee. However, consideration has been given to the results of investigations that have been made to determine the effects of drying pieces smaller in cross section than ties, and it is assumed that, in general, ties behave in the same manner as other lumber with similar characteristics.

Why Does Wood Shrink?

Moisture in wood is commonly called "sap," but for practical drying purposes it may be considered as merely water. In green wood, water is held (1) in bulk (free) within the cell cavities, and (2) in the cell walls. Sapwood contains more "free" water than does heartwood. During any given year, variations in the amount of moisture contained in green wood are slight. The species of the wood and the place of growth have important bearing on the amount of moisture in the living tree.

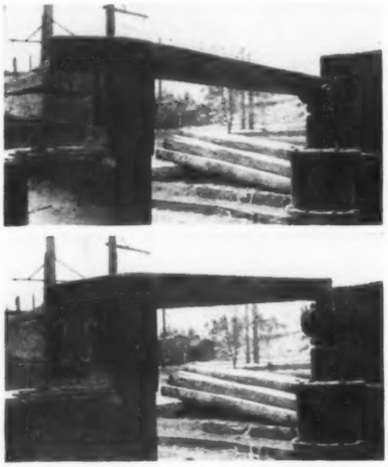
Shrinkage of wood takes place only in conjunction with loss of moisture. It does not start until the cells have given up their free water and their walls have begun to lose moisture. The condition in which the cell cavities are entirely empty, while the cell walls are still saturated, is known as the "fibre-saturation point." The moisture content of the wood at this point ranges between 20 and 35 per cent, the percentage varying between different species of wood and also between different specimens of the same species.

All sections of a piece of drying wood do not reach the fibre-saturation point simultaneously; actually the cells near the surface dry below the fibre-saturation point before those on the interior reach it. Thus, though the average moisture content of the whole piece may be above the fibre-saturation point, the outer portion shrinks while the inner does not, and the resistance of the moist interior to the compressive effect of the shrinking outer portion results in checks and splits in the latter.

Action of Moisture

Moisture from the interior of a piece of wood comes to the surface either as a vapor moving along the capillary channels in the wood after evaporation inside the piece, or as a liquid moving through these channels or through the cell walls. Owing to the nature of wood structure, the ends of a piece lose moisture more rapidly than the sides, and the sides more rapidly than the interior. Wood shrinks most in the direction of the annual rings (tangentially), about one-half as much across the rings (radially), and very little, as a rule, along the grain (longitudinally). There is no direct relationship between the initial moisture content of green wood and its shrinkage as it dries. This is true because shrinkage does not begin in a piece of wood until the fibre-saturation point is reached, from which point the shrinkage in drying is practically in proportion to the moisture lost.

The point at which a tie will split cannot be determined, and splitting may occur even after a tie has been placed in track. However, most splits occur during the summer, when the excessive heat causes unusually rapid seasoning. While most splits start at the ends of the ties, some develop from deep checks along a face or edge in ties that have their pith near a surface. Splits usually follow radial lines—both vertically and diagonally through the pith. The majority extend from the top to the bottom of the tie, which is the shortest distance through it and is therefore the line of least resistance to splitting stresses. Owing to the additional sapwood on their sides, round ties will split to a considerably greater extent than rectangular ties.



Before and After Squeezing and Ironing a Badly Split Tie

Any split is harmful and should be controlled before it materially lessens the serviceability of the tie. Splits that occur after treatment expose untreated wood to the entrance of fungi, and the life of the tie is materially shortened by the resulting decay. Splits reduce the bearing area, causing the severed sections to be subjected to greater cutting action by the tie plate or the rail. A split tie cannot be properly tamped, and the holding power of the spikes is reduced.

Visits made by the committee to numerous seasoning yards at wood-preserving plants during the past 15 years have afforded an opportunity to gain extended knowledge of the methods that are in use to prevent the splitting of ties. The primary conclusion that has been drawn from these observations is that, while railroads agree that the loss resulting from splitting should be controlled, they differ in their opinions as to the proper procedure to be followed in accomplishing this end.

The first step to be taken in reducing the splitting of ties is to control the rate of drying. If it were feasible to season a tie in such a manner that there would be a uniform loss of moisture throughout the entire piece, shrinkage stresses would be eliminated, thereby preventing splits. The cost of kiln-drying timbers as large in cross-section as ties makes that process impracticable.

Factors in Air Seasoning

In the air-seasoning of ties the important factors are the temperature and the relative humidity of the atmosphere at the surface of the wood, and the proper circulation of the air around the ties is of extreme importance in the control of these factors. Since the circulation of air controls the rate at which the evaporated moisture will be carried away, while the air currents are affected by the direction, location and width of the spaces between stacks of ties, the method of making the stacks is the controlling factor in providing proper circulation. Horizontal circulation near the bottoms of, and beneath, stacks of ties is necessary for the vertical circulation of air, which is of the utmost importance. The circulation of air in a horizontal direction can be regulated to some extent by means of appropriate variation in the yard layout.

Practice Varies as to the Type and Number of Anti-Splitting Devices to Be Employed and as to When They Should Be Applied

During the drying of green ties, heat is absorbed by the wood, and the surrounding air thus becomes cooler and heavier, with the result that it descends toward the bottom of the stack. Hence, the arrangement of the stack should be designed to aid this natural movement, permitting, as far as possible, an unobstructed and continuous flow of air. Care must be taken to prevent air in the lower portion of the stack from stagnating.

Anti-Splitting Irons

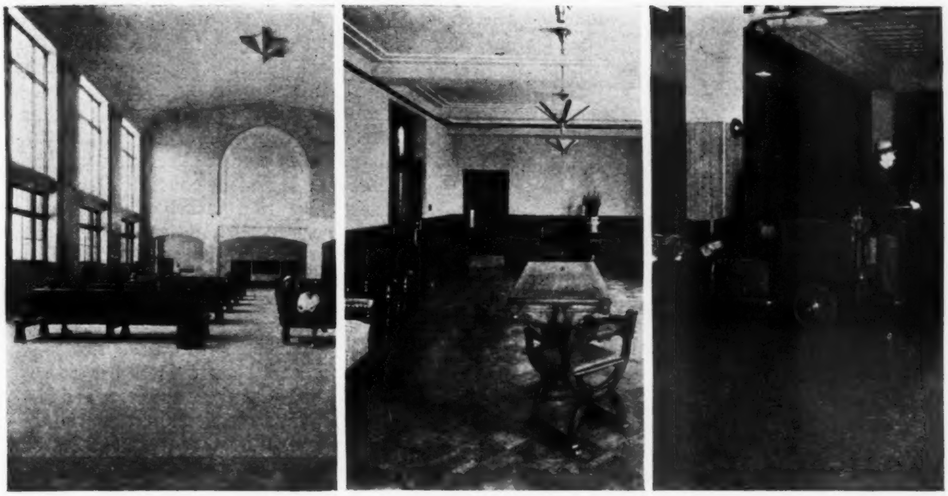
Metal devices to hold the wood in place have been quite generally adopted by railroads in seeking a solution of the tie-splitting problem. Most of these anti-splitting irons are of the same type, differing only in shape; but the methods of their application vary. Some railroads apply two irons to each end of all hardwood ties (except gum) as they are stacked; others double-iron only main-line ties and single-iron side-track ties. Another method is to single-iron all ties on arrival at the plant and later apply a second iron to both ends of each tie.

Some railroads use a so-called "selective" system, i.e., they iron only those ties that show indications of splitting at the time of stacking and then make periodical inspections for the purpose of determining if additional irons are needed. Other railroads apply irons according to the needs apparent on the arrival of the ties, but do no further ironing until the ties are trammed for treatment, when all those that have splits or show indications of splitting are ironed. Some railroads do not apply irons until the ties are to be treated and then only to those that seem to need them.

Applying Irons

Badly-split ties are squeezed together in various ways and their parts are then fastened by bands, bolts, dowels or several irons. The point that stands out in regard to all of the methods of ironing ties that have been observed is the necessity for the proper application of the anti-splitting devices. To be effective, irons must be applied by intelligent labor capable of judging the splitting probabilities in each case.

Loss from badly-split ties is minimized where it is possible to select timber that has only a slight tendency to split. There is reason for believing that some species of oak, grown under certain conditions, are more subject to splitting than other species from different localities.



Careful Consideration Must Be Given to Appearance, Comfort and Service Requirements in Selecting the Type of Floor Best Suited to Meet the Specific Conditions Involved

What Kind of a Floor?

By A. L. SPARKS, Architect
Missouri-Kansas-Texas
St. Louis, Mo.

It depends upon many conditions according to the author of this article, who, with specific reference to large and small passenger stations and their related baggage-handling areas, discusses the various types of flooring materials available with regard to their appearance, service characteristics and maintenance

IN THE April issue there was a discussion of the relative advantages of wood, tile, brick, concrete and composition floors for small and large stations.* This discussion evoked considerable interest in the minds of many who read it, especially those who have used all of these type of floors with varying degrees of success. Materials that are not successful in some localities may sometimes be popular in others. Again, one of these materials may be highly successful in a given type of building under one set of conditions, but unsatisfactory in an identical building under other conditions. The reasons for this are that each of these materials possesses some individual merits which qualify it for use under appropriate conditions.

All of the materials that were mentioned in the question that evoked this discussion have been used for floors in both small and large stations, and each possesses certain advantages that the others do not possess. For this reason, it will be well to consider the most important qualifications of each of the five types under consideration, in the order they were named. In giving this consideration, mention will be made of the suitability of some of the materials in related buildings, such as warehouses, freight houses, etc., and mention will also be made of two types of flooring not mentioned in the original question.

Although wood is sometimes considered to be an obsolete material for modern construction, particularly for floors, it possesses qualities that cannot be duplicated and are difficult to equal in any way. Because of this it will probably continue to be used in the best of buildings as well as in the cheapest type of construction. It has always been so plentiful that many consider it commonplace, and builders have often failed to take advantage of its possibilities, so that in many instances its appearance has been worse than commonplace, but there are types of floors for which it excels all other flooring materials.

As an example of this excellence, creosoted black gum has long been known to be one of the best materials for highway grade crossings. It was then utilized as decking for outside platforms, and more recently has been used as flooring for piers, warehouses, freight houses and elsewhere where much trucking is done and where heavy machinery is being handled. This species has a tough, close-grained texture and is not easily split. When cut to the thickness of plank it exhibits a tendency to warp and curl, but this difficulty can be overcome easily by exercising care to insure that it is fastened securely. At the present market, black gum can be obtained for less cost than pine or fir.

Wood Blocks

Wood blocks laid with the grain vertical have shown a surprising resistance to wear under heavy trucking in shops, warehouses, freight houses and on piers, where not a few other materials have failed. Hard-maple flooring, 1 in. or more in thickness, also resists hard wear. Where soil conditions do not permit a stable foundation, wood floors on simple pile-butt foundations are not seriously affected by settlement, and can be constructed at less expense than other types.

Hardwood parquet floors, laid in patterns, according to various designs,

*What's the Answer department, page 269, April, 1940.

are used in some of the finest buildings, in rooms where quiet and restfulness are desirable. Wood is easy on the feet, does not sweat and provides a dryer, warmer surface where goods are stored that may be affected seriously by dampness. Wood can be obtained easily in any section of the country, and repairs and replacements can be made by the average bridge and building carpenter forces. Furthermore, any of the more open-grained woods is susceptible to preservative treatment of one kind or another to prevent decay and repel the attacks of insects and other vermin.

Many Pleasing Designs and Colorful Patterns Are Available in Various Types of Floor Coverings

Tile Is Popular

Tile is popular as a material for flooring in the better class of buildings, because it can be cleaned so easily. Where it is not subjected to the travel of metal-tired wheels or blows from hard objects, tile will resist long, hard usage. It is non-absorbent, sanitary, and not easily stained. It is made in many colors and sizes and may be laid in a wide variety of patterns to correspond with the architectural requirements of almost any type of room or building.

Tile is fire resistive and vermin proof. It will wear longer than most other materials, and retains its color and fresh appearance during its entire service life. It is more expensive than a concrete surface, but, generally, is less expensive than marble. The types of tile that are used most commonly provide a hard smooth surface, but there are other types that provide non-slip surfaces for use on ramps and other sloping surfaces, in vestibules and on stairs.

Although used less widely than tile as a material for station floors, brick is one of the oldest of flooring materials. In addition to the individual characteristics which it possesses, it also possesses some of the qualities of tile, as might be expected from two products made from raw materials so nearly alike. It is fire resistive and vermin proof and can be cleaned easily. It resists hard wear, even under metal wheels.

Brick floors can be laid in a variety of patterns suitable to specially designed rooms. Square-edged, hard burned, vitrified brick, laid in the same manner as quarry tile with sealed joints, provides a sanitary, waterproof surface, and is sometimes used as a wearing surface for promenade decks, and on flat roofs subject to heavy foot traffic. Since brick is manufactured widely and can be obtained easily in any section of the country, it is usually less expensive than quarry tile. Where the installation is limited to standard shapes, sizes and colors, replacements can be made at minimum cost and, generally, broken single units can be replaced without disturbing others that are adjacent.

Concrete Has a Place

Concrete is used so nearly universally in the construction field that it is only natural that it is being used for floors in almost every type and class of building. Where fire resistive construction is demanded it is probably the least expensive of all of the materials suitable for this purpose. In addition to being fireproof, concrete floors are waterproof, vermin and insect proof, and sanitary, although they sweat. When an integral hardener is added, concrete floors are practically non-absorbent and non-abrasive. In their normal finish they do not resist the abrasion created by heavy trucking, particularly where steel tires are employed. If carborundum or similar material is added to the concrete mixture, non-skid surfaces can be provided for ramps and stairs. Concrete surfaces are difficult to patch, but can be repaired, or resurfaced with other materials, when they become severely worn.

Tile of Various Types and Designs Makes a Highly Desirable, Sanitary Floor for Toilet and Wash Rooms

If integral coloring is used, floors of this material may be laid in patterns suitable for buildings of special design. They also provide a suitable base upon which a variety of floor coverings may be cemented, including linoleum, rubber tile, cork, carpets and other materials suitable for the uses to which a floor may be subjected. They have the advantage that they can be constructed quickly of materials that are available in almost any market.

Asphalt mastic mixed with portland cement and finely crushed stone is acid-resisting, resilient, flexible and waterproof. It resists hard wear, has a long service life and makes a good trucking surface, but sweats under some conditions, especially in unheated buildings. Unless it contains sufficient hardening ingredients, however—that is, fine stone, sand and cement—it may become indented under heavy standing loads, but it is easily repaired.

Terrazzo flooring laid over concrete provides one of the finest floor materials available. It may be laid in beautiful colors and in the most intricate patterns and thus affords almost unlimited possibilities in design. Through the insertion of thin metal strips, better provision is made for expansion and contraction than is usually practicable for concrete surfaces. Plain terrazzo is generally less expensive than tile or marble, but requires expert skill for its application. It possesses most of the desirable qualities of tile and shows dirt to a less extent than almost any other type of flooring. It may be used to advantage on curved and warped surfaces.

Composition floors are generally trowled over concrete, although some types are laid over wood or steel. Some compositions, including magnesite, are applied in thin layers over any type of solid base. They are also non-absorbent and sanitary, but re-

(Continued on page 515)

This 1043-Ft. Merchandise Dock at St. Louis, Involving Piles up to 85 Ft. in Length, Was Practically Rebuilt With Wolman-Treated Timber

Alton and Southern

Treats Lumber and Timber With Wolman Salts

This article tells of the use that this road has made of Wolman salts preservative treatment for lumber, timber and piles in a large merchandise dock, coaling plant and foot bridge, and also for bridge and track ties, to prevent decay and termite attack. In each case cited, the article presents the history of the treatment employed and specifies the salt retention that was used

THE Alton and Southern has made extensive use of Wolmanized lumber and piling in a number of structures in recent years, including a large merchandise dock, a locomotive coaling bin and a footbridge. In addition, it has made several test installations of Wolmanized crossties and telegraph poles, and has used lumber so treated for the flooring of miscellaneous right-of-way and yard buildings. To date, the total amount of such material has included approximately 37,400 lin. ft. of piling, 420,000 ft. b.m. of dimension timbers and lumber, 1,320 trestle ties and 6,575 crossties, and approximately 250 poles.

Extensive Use in Dock

The Alton and Southern, which is essentially an interchange road serving St. Louis, Mo., and East St. Louis, Ill., with 44.04 miles of main tracks and 39.19 miles of yard, team, passing and industry tracks, began using Wolmanized timber in 1931, when it installed a test section of 500 red oak ties in its Kings Highway passing track. In 1932, it extended the use of such material to the reconstruction of its large timber merchandise dock at East St. Louis, when the first one-third of this structure was renewed, the dock work in that year involving the use of 87,000 ft. b.m. of Wolmanized structural timber in the deck and for bracing, and 850 lin. ft. of Wolmanized piling.

The dock, which is located at the road's Fox terminal along the east bank of the Mississippi river, is a timber pile structure carrying two tracks, built low on the sloping bank of the river, parallel with and well to the water side of the inner harbor line. In this location, it can serve river boats at any water stage, this being done generally by means of conveyors or cranes.

80 to 85-Ft. Piles

The dock is approximately 1,043 ft. long, and its deck level is approximately 38 ft. above the ground line on the river side and about 26 ft. above the ground line on the shore side. Essentially, its construction includes seventy-nine 10-pile bents on 14-ft. centers, suitably braced laterally and longitudinally, the individual piles ranging from 80 to 85 ft. in length, and the bracing consisting principally of 3-in. by 10-in. dimension timbers. The bent caps are 12-in. by 14-in. in size.

The deck of the dock, which is 40 ft. wide, has four lines of 8-in. by 16-in. stringers beneath each track

rail, which support 6½-in. by 7½-in. ties from 10 to 28 ft. long. Between and outside of each track, the deck is closed in with 2-in. planking, and both edges of the deck are protected with wood railings of 4-in. by 6-in. posts and 2-in. by 8-in. and 2-in. by 6-in. rails. The deck is not housed over in any way, the only fixed structures above its surface including a coal conveyor tower, spanning both tracks, which is of timber construction throughout, and two small sheet metal buildings, one used as a tool house in connection with the coal conveyor, and the other, located at the extreme south end of the dock, being used essentially to house tackle and miscellaneous gear.

Dock Rebuilt in Sections

In 1932, when a three-year program for completely rebuilding the dock in kind was started, the north third of the structure, including 27 bents, was rebuilt, using Wolmanized timber throughout for the deck and bracing, and piles similarly treated in one bent. All of the other bents were replaced with creosoted piling. As stated previously, this work required the use of 87,000 ft. b.m. of Wolmanized structural timber, 850 lin. ft., of Wolmanized piling, and 308 trestle ties.

In 1933, when the middle third of the dock was rebuilt, all of the bents were renewed with creosoted piling, but the entire deck structure was replaced with Wolmanized timber, which involved the use of 117,000 ft. b.m. of structural timber and 484 trestle ties. In that same year, the overhead coal conveyor was also renewed with Wolmanized timber, using another 24,000 ft. b.m. of this material. When the final third of the dock was renewed in 1934, all of the timber piling used in this section, involving 21,626 lin. ft., was Wolmanized, and 165,000 ft. b.m. of structural timber and 530 trestle ties which were similarly treated, were used out-of-face in renewing the deck.

Left Above — The Wolman-Treated Ties in the Kings Highway Passing Track Were Inserted in 1931. Left— The Deck of the Merchandise Dock, Showing the Overhead Conveyor. Below — Salt-Treated Material Was Used Throughout in This Foot Bridge

Supplementing this use of Wolmanized material in the dock itself, approximately 7,450 lin. ft. of Wolmanized piling was installed in a new fender system for the dock in 1936, this including 18 clusters of 7 to 14 piles each, and, in 1937, an equal amount of Wolmanized piling was employed in a new ice deflector system for the dock. In this latter system, which lies upstream from the dock, there are 18 pile clusters, generally with 7 piles each, arranged in a straight line with the clusters spaced on approximately 20-ft. centers.

Other Uses

Other important uses of Wolmanized structural timber on the Alton and Southern include that in a locomotive coaling bin at the road's engine terminal at East St. Louis, and that in a pedestrian bridge over three tracks at Dallas street, also in East St. Louis. The former of these structures, built in 1938, and comprising essentially two 55-ton elevated hoppers of timber construction supported on 12-in. by 12-in. posts, required the use of 19,700 ft. b.m. of timber, while the latter, with two 66-ft. wood trusses and wood stair approaches at both ends, built in 1934, required the use of approximately 7,000 ft. b.m. of timber.

In addition to these uses of Wolmanized timber for structural purposes, the road enlarged the initial test of 500 Wolmanized crossties, made in its Kings Highway passing track in 1931, by installing 3,443 similarly treated ties at scattered points in its main line tracks in 1933, and another 2,629 such ties in four of the tracks of its Davis classification yard in East St. Louis in 1934. All of the ties installed in the passing track and yard tracks are in cinder ballast, while all of those installed in main tracks are in hard slag ballast. All of these ties are of red oak, while all of the lumber, structural timbers, piles and poles treated with Wolman Salts preservative have been of either long-leaf or short-leaf yellow pine, the former being used generally for piles and poles and the latter for structural lumber and timbers.

Treatments Used

Except in the earliest cases of treatment, when the Wolman Salts Triolith treatment was used, all of the material has been given the Wolman Salts Tanalith treatment, the latter including the following ingredients for protection against decay and the attacks of termites; sodium fluoride, arsenate, dinitro-phenol and neutralizing chromates, the arsenate being

the active termite-repelling ingredient, which is not included in the Triolith treatment.

These salts, in solution in water to a strength concentration of 1.8 to 2 per cent, are applied to the properly seasoned wood under a pressure process to a retention in the wood generally of 0.25 lb. to 0.4 lb. per cu. ft., depending upon the severity of the exposure to which the wood will be subjected. In the treatment of the ties and timbers used on the Alton and Southern, all of which was done by commercial treating plants, the ties were treated to a retention of 0.25 lb. per cu. ft., the piles and poles to a retention of 0.3 to 0.33 lb. per cu. ft., and the dimension and structural timbers to a retention of 0.25 to 0.3 lb. per cu. ft. None of the timber was framed before treatment, but all surfaces exposed in making field cuts, including the tops of piles, were swabbed with a hot mixture of creosote and coal tar pitch. Furthermore, all holes bored were given a field pressure treatment with creosote, and the tops of bent caps were swabbed with pitch.

All of these installations of Wolmanized material were made under the direction of W. J. Nuebling, chief engineer and purchasing agent.

What Kind of Floor ?

(Continued from page 512)

quire special skill in mixing and applying. They are resistant to ordinary wear and when properly applied will withstand some distortion without cracking.

Having outlined the principal characteristics of the various kinds of flooring that can be used in small stations, it remains to see how well they are adapted for this use, taking all factors into consideration. It appears that, in general, wood and concrete are most suitable for flooring in the smaller stations, using concrete for the waiting rooms, office and toilet, and wood for the baggage and freight rooms. These materials are recommended for this use because of their lower initial cost, and the fact that they can be maintained by the average bridge and building carpenter gang with materials that are readily available.

For the larger stations, terrazzo or tile floors are generally the most advantageous for waiting rooms, dining rooms, toilets, etc., since they require practically no maintenance, they are easily kept clean and present a pleasing appearance throughout a long service life. They are hard and nonresilient, for which reason they are not suited for offices where much standing is necessary. It is better, therefore, to provide concrete floors for these rooms, covering them with heavy linoleum, which is sanitary, resilient and comfortable to walk or stand on.

Wood blocks or asphalt mastic, laid on a concrete base, are best adapted for baggage rooms and other service rooms, since they resist hard wear and rough usage successfully, provide a surface suitable for trucking, and are easily repaired without it being necessary to interrupt service to do so.

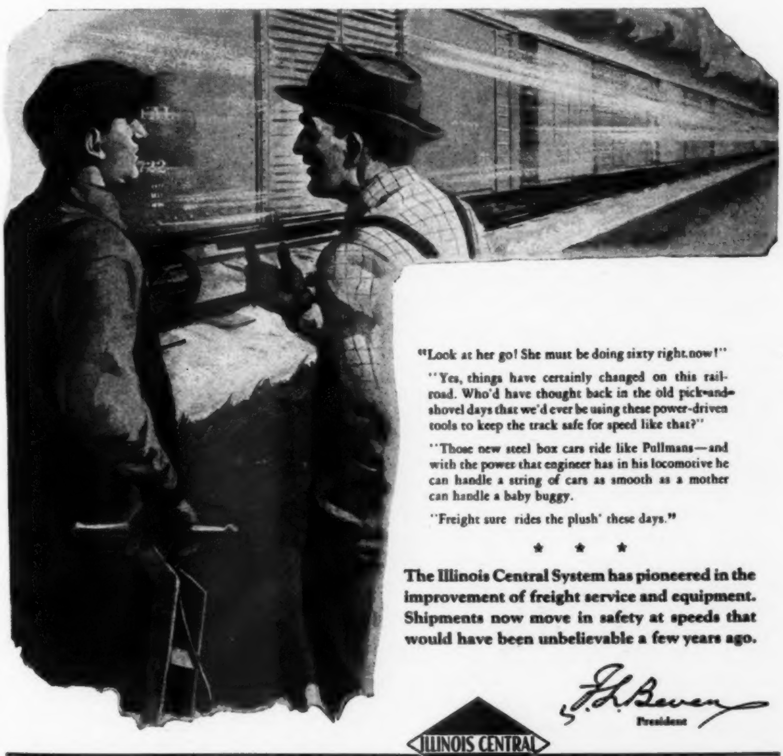
Wood blocks and creosoted blackgum plank can be used to better advantage than other materials for floors in large freight rooms, since they are highly resistant to the type of wear encountered in freight houses. Even under the heaviest service they have long life, and they can be repaired quickly and easily without interruptions to the freight-house operations. They assure a dry surface on which to store absorbent merchandise that may be damaged easily by moisture, because they do not sweat.

More Service From Curve Lubricators

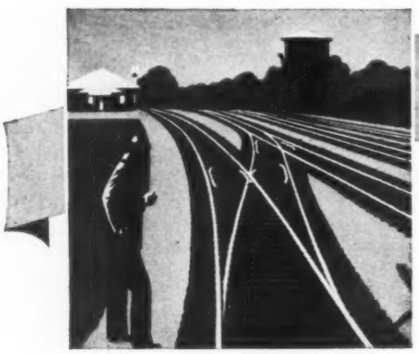
(Continued from page 505)

which 51 were inserted on branch lines at once, while the other 9 are being installed in service wherever they are most needed. The 51 lubricators were distributed among 14 different branch lines, 11 of which had not previously received the benefits of lubrication. The branches thus to be benefited are for the most part relatively short feeder lines in the West Virginia and Kentucky coal fields, and the number of lubricators applied on the different branches ranges from 2 to 8.

In applying the lubricators on branch lines it was not the object to lubricate all curves above a certain degree of curvature, as on main lines, but only to afford relief at certain of the more troublesome locations. Many of the branch lines in question embody relatively sharp curves that, in the absence of lubricators, are a deterrent to efficient train operation. Since curve lubricators help to overcome these difficulties by preventing derailments and making possible increased tonnage ratings, it was largely for this purpose, rather than to reduce rail side wear, that the machines were installed on branch lines.



Recent Institutional Advertising of the Illinois Central Recognizes the Large Part Being Played by the Track Forces and Power Tools and Equipment in Making Possible Present-Day High-Speed Freight Traffic



WHAT'S the Answer?

Where to Place Switch Stands

Should switch stands for main-track turnouts be placed on the turn-out side of the track or should they be placed on the engineman's side for trains facing the switch? On sidings and yard ladders? Why?

Not Determining Factor

By W. L. Roller
Division Engineer, Chesapeake & Ohio, Columbus, Ohio

There are good reasons for placing main-track switch stands on the engineman's side of the track, especially when his train is making a facing-point movement toward the turnout. However, this should not be the determining factor in locating the stands for the safest and most effective operation. If the stand for a facing-point switch is placed on the engineman's side, irrespective of whether the turnout is right or left hand, it will be in position to be seen most advantageously on tangents; on curves this advantage may be lost completely.

Visibility, while desirable, should not be the governing factor in placing the stand, for one must also consider (1) whether it will give the best and safest installation from the viewpoint of operation; (2) whether it is the most practical installation from the trackman's viewpoint; and (3) whether the decision as to placement will give a standard that is at once both simple and effective.

If one will place the stand invariably on the turnout side he will attain all of these objectives without sacrificing any of the advantages of other settings. In addition, the connecting rod will always be in tension when the switch is lined up for normal or main-track movements. This is the safest position for the stand for several reasons, among which are (1) it is easier to detect defects in the rod, connecting bolts and stand when it is necessary to pull rather than push the point into position; (2) the point for the main-track movement is nearest the stand and is, therefore, more easily checked; (3) the "feel" of the rod in tension, when throwing the switch to normal position, is more positive than when the rod is in compression; (4) the strength of the connecting rod is relatively greater in tension than in compression, thereby offering a greater factor of safety; (5) any dragging parts that may catch the bridle rods and bend them will not open the main track point; and (6) any obstruction between the point and the stock rail will be detected more readily when the points are being pulled than when they are being pushed.

By making it a uniform practice to place switch stands on the turnout side, the procedure for trackmen, signalmen and trainmen will be simple and understandable. In automatic-block territory the position of the switch stand is not vital, for the turnout is protected by the signals; but for reverse operation on multiple-track lines, the additional protection given by the switch lamp indication is a real advantage. This protection is afforded in the case of trailing turnouts for crossovers, which become facing-point turnouts for reverse operation, if the stands are placed on the turnout side, at a time when the turnout has no signal protection.

The same practice should be followed of placing the stands on the turnout side for sidings. On yard ladders it is not practicable to follow this rule. Especially on heavy switching ladders, it is better to have the stands and lights on the outside of the

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered In October

1. *What practices should be prohibited to insure against injury to men using track jacks?*

2. *What type of roofing is most satisfactory for freight transfer platforms? Why?*

3. *Can weeds on the right of way be controlled better by burning than by regulated mowing? Why? Is burning more destructive to objectionable weeds than to desirable grasses?*

4. *What minimum width should be required for pipe-line trenches? Why? What is the most economical width? What difference does the diameter of the pipe or the depth of the trench make?*

5. *Should foremen for work train service be specially selected? Why? What qualifications are required?*

6. *Under what conditions is it more economical for bridge and building gangs to travel to and from work on motor cars or motor trucks than to assign outfit cars for their use? What factors tend to influence this economy?*

7. *When renewing ties without giving the track a general surface, how many ties should be inserted per man-hour in stone ballast? In gravel? When giving the track a lift of 2 in.?*

8. *Should the circle rail of a turntable be supported directly on the concrete or on wood ties? Why? What type of fastenings should be used?*

ladder, set well back with long connecting rods to afford good visibility as well as ample space for cutting cars in switching. In any event, movements on ladders are almost invariably at low speed and are made on signal.

Think of Safety

By J. L. Monk
Section Foreman, Southern Pacific, Tombstone, Ariz.

In all considerations of track standards and maintenance practices, one should think first of safety. It seems to me that this question touches rather definitely on safety, for if the switch stand is placed on the turnout side, the closed or main-line point will be held against the stock rail by the tension in the connecting rod. However, if the stand is placed on the engineman's side for facing-point movements, it will be the push and not the pull of the connecting rod that will be depended on to hold this point in place. Under this condition there will be nothing to prevent a dragging part from a car from bending the switch rods and pulling the closed point away from the stock rail.

Always on Turnout Side

By J. Morgan
Retired Supervisor, Central of Georgia, Leeds, Ala.

In all cases switch stands for main-line turnouts should be placed on the turn-out side for safety. Where this is done, the point is held in position against the stock rail by the pulling action of the connecting rod instead of by pushing action, as would be the case if the stand were placed on the opposite side of the track. Furthermore, the main-line point will not be pulled out of position if a brake beam comes down and catches the switch rods, for the point will be held firmly by the tension in the connecting rod. If, however, the stand is on the opposite side of the track there will be no force to resist the tendency of the point to pull away from the rail in the event the switch rods are bent.

Repairing Masonry Substructures

What methods should be followed in making repairs to under-water portions of masonry substructures?

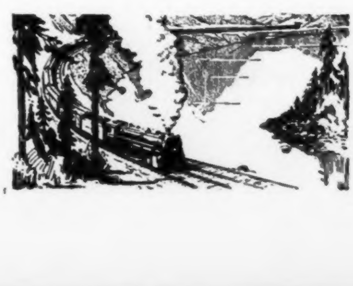
Depends on Damage

By M. Hirschthal
Concrete Engineer, Delaware, Lackawanna & Western, Hoboken, N.J.

This question as to what methods should be followed in making repairs to under-water concrete or other masonry suggests at once its correlated question of determining the amount and character of the disintegration or erosion that the masonry in question has suffered. Such an investigation is quite important and may even require the employment of a diver to explore the foundation of the structure to determine the amount of undermining, if any, that has occurred.

The method of repair will then depend on the size of the structure, the character and location of the deterioration and the character and flow of the waterway in which the structure is located. For example, if the deterioration is between high and low water levels in tidal waters, all that may be required will be the erection of forms, properly and securely set by either anchor bolts or firm bracing; the embedment of dowels for bonding the existing concrete to the new concrete; and such reinforcement as may be required. The concrete can then be placed at low tide. On such work it will be advisable to permit the form lumber to remain in place. Where the salinity of the water is high, the lumber used for the forms can be creosoted as a protection against future chemical action.

In a stream having an appreciable current velocity, with or without tidal action, where the deterioration extends well below low water, it will be necessary to drive sheet piling to form a coffer dam, placing the concrete by means of a tremie, and using the necessary precautions to keep the pipe full, or by means of a special drop-bottom bucket. Where it is possible to do so, it is advisable to dewater the coffer dam to examine the work before the placing of the concrete is started.



Pumping should not be done while the concrete is being placed.

If the current velocity is high, it may be necessary to provide a double line of sheet piling to provide a coffer dam sufficiently water tight to reduce the inflow to a maximum of 10 ft. per min. In this case the concrete may be placed with a tremie, a drop-bottom bucket or by means of pumping equipment. In all cases, however, all of the precautions required for placing concrete under water must be observed. These include continuity of placement, elimination of disturbance of the concrete to prevent formation of laitance and a relatively dry mix.

If the job is of considerable magnitude, it will justify a design plan indicating the location of the dowels for tying the new masonry to the old, and the positioning of the reinforcement. In some cases it may be necessary to provide encasement for piers, in which event the reinforcement must be of sufficient cross-sectional area to insure unified action between the old and new masonry.

If the deterioration consists of the disintegration of the toe of the footing of an abutment, it will be necessary to design a new toe that will act as underpinning for the existing toe. To construct such an underpinning, properly doweled, bonded and reinforced to insure combined action and resistance to overturning and other forces, it will be necessary to construct a coffer dam and do the work in the open.

Under-water repairs should not be attempted where the temperature of the water is less than 40 deg. and the minimum should preferably be 50 deg., for concrete sets slowly at low temperatures.

Keep Work in Open

By General Inspector of Bridges

I assume that this question refers primarily to field methods of making under-water repairs to masonry structures and not to questions of design, except so far as they may affect construction plans. In general, today, repairs to and replacements of masonry are made with concrete. Placed in the open, concrete is susceptible to close control so that the engineer has some assurance as to the quality of the concrete that is being produced. If the concrete is placed under water, all of the precautions that may be taken with respect to the quality of the materials, proportioning, etc., may be nullified by a small amount of carelessness, inattention to some essential detail or by accident.

For these reasons, I have always

avoided the placement of concrete under water where it was practicable to do so. I have made repairs to the under-water portions of masonry substructures on many occasions, and have always been able to do the work in the open, although in some instances this was far from easy. When the work is done in the open, one is able to see what is going on; if it is performed under water he can only hope for the best—he may be reasonably certain in some instances, but he never really knows.

The first action should be to have the substructure examined by an experienced and reliable diver. I would then construct a coffer dam around the defective masonry and unwater it. The report of the diver should be checked and the plans altered, if necessary, after which I would go ahead and make the repairs in the same way as if the structure were on dry land. This sounds simple enough; yet it occurs many times that the construction and the unwatering of the coffer dam present real difficulties and sometimes tax one's ingenuity. Sometimes, too, the repairs are not easily made, but this may happen with any structure and under almost all conditions.

Timbers Under Railway Crossings

What is the most satisfactory arrangement for the timbers under a railway crossing? Why?

Must Be Well Drained

By George J. Slibeck
Sales Engineer, Pettibone Mulliken Corporation, Chicago

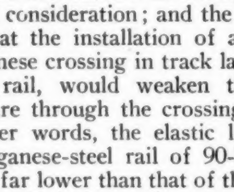
Obviously, the kind and arrangement of the timbers under a crossing constitute an important part of the crossing layout. It should be equally obvious that no single answer to this question will hold good for all crossings. In fact, several things must be known before completely satisfactory support can be assured in any individual case.

To obtain some background for this subject, it is well to remember that about 1920, when the Track Committee of the A.R.E.A. was beginning to bring some order out of the confusion of ideas that had prevailed up to that time with respect to the kinds, lengths and shapes of track structures, the placing of timbers under crossings came up for consideration. At that time, a 90-lb. rail was considered a heavy section. Logically, a 90-lb. bolted crossing, which was held together with bolts that had not been heat treated and which broke too often, was considered a heavy-duty crossing. Ties for supporting the crossing were given little consideration, because almost any arrangement of the timber gave what were looked upon as satisfactory results, provided the crossing was reasonably well drained and the bolts were tightened daily. The looseness of the crossings themselves gave them so much articulation that they did not break. On the contrary, they got loose so fast and stayed loose so persistently that the roadmaster did not stop to figure out that perhaps one line of traffic was doing more damage than the other.

About this time the solid manganese steel crossing entered the picture and almost over night it became apparent to trackmen that they were confronted with an entirely new and novel situation. They were being called on to maintain a crossing that had no looseness; that was rigid from one end to the other; and that had to be supported accordingly.

In other words, the trackmen could no longer allow one end of the tie to pump up and down while the other end remained rigidly on a solid bearing, for this would break the crossing. In fact, many of the early crossings failed from this cause alone. They usually cracked through the intersection of the flangeways, and manufacturers replaced many crossings before they discovered two things. The first was that the tie arrangement needed consideration; and the second was that the installation of a 90-lb. manganese crossing in track laid with 90-lb. rail, would weaken the rail structure through the crossing itself. In other words, the elastic limit of a manganese-steel rail of 90-lb. section is far lower than that of the same section rolled of open-hearth steel.

As locomotives and cars were increasing in weight, something had to be done about the matter at once. As a result, it was recommended that nothing less than a depth of 6 in. be used for manganese steel crossings. This was of benefit because it increased the rigidity of the crossing. Next the timbers supporting the crossing were given attention and the Track committee recommended the arrangements that are now shown on Track Plans 719, A, B, C and D.



So far as I am able to judge, the tie arrangement shown on Plans 719 A, B and C, covering crossing angles from 8 deg. 10 min. to 50 deg., cannot be improved or changed very much. Plan 719 D, which covers crossings from 50 to 90 deg. shows three different layouts, each of which has its place under certain traffic conditions. For heavy traffic on one line and a moderate amount under the other, my experience leads me to believe that the crossing should be laid with the ties longitudinally under the line having the heavier traffic. If this is done, through traffic over one line will not disturb the ties under an adjacent crossing.

It seems almost superfluous to say that, regardless of what arrangement of ties is used, unless the crossing is drained adequately, and it is supported on a full section of ballast, will not give fully satisfactory results with respect to service life. [Plans 719 A, B and C, call for the crossing timbers to be laid at right angles to the line bisecting the small angle of the crossing. Plan 719 D presents one scheme in which the arrangement of the ties is practically the same as in plans A, B and C, while a second scheme calls for the crossing timbers to be laid parallel to the track ties in the line of heavier traffic, and a third scheme calls for longitudinal timbers under the heavy-traffic line.—Editor.]

Two Methods in Use

By G. P. Palmer
Engineer Maintenance and Construction, Baltimore & Ohio Chicago Terminal, Chicago

There are two methods in general use today of arranging ties and timbers for the support of railway crossings. The first is to install switch ties diagonally under the crossing, placing them at right angles to the axis of the crossing or the line bisecting the small angle of the crossing. This applies to crossings having angles less than 90 deg. The second is to place timbers longitudinally under the rails of one of the tracks, with additional timbers parallel to them.

The American Railway Engineering Association recommends the use of the diagonal ties for all crossings hav-

ing angles less than 50 deg., and longitudinal timbers for angles between 50 and 90 deg. We have found by experience that the use of timbers under crossings having angles from 70 to 90 deg. gives better support than switch ties placed diagonally, and results in longer life for the crossing. Ordinarily, these timbers are placed under the line having the heaviest traffic. However, if the crossing is of the built-up type, we find it preferable to place the timbers longitudinally under the cut rails, to give support where it is needed, regardless of the volume of traffic on either line.

We have also discovered that large timbers give better results than small ones, and in some instances we have bolted together three 7-in. by 9-in. switch ties to form one timber 9 in. by 21 in., with excellent results. Timbers can also be utilized to advantage on crossings from 50 to 70 deg., but there may be some difficulty in obtaining timbers long enough as the angle decreases.

Where switch ties are used in the diagonal arrangement, we find that the closer they are placed together the better the riding condition and the longer the life of the crossing. Where this is done, however, the tamping must be done with power tamping tools or tamping bars, instead of tamping picks.

After any railway crossing has been in service for a short time, a certain amount of vibration develops when the wheels jump across the gap made by the flangeways. For this reason, the more solidly one can support the crossing, the more this vibration can be reduced. Excessive vibration results in rapid wear of the crossing and is followed by breakage of the parts making up the assembly. This consideration also introduces the question of the type of ballast to be used. We have found that the smaller sizes of stone ballast give more satisfactory results than the larger sizes that are generally used on open track where there are no switches or crossings.

In this connection it might be well to call attention to the possibility of using framed timbers to support the rails of both lines. This will give longitudinal support to all rails. One of the larger roads is using this scheme at certain points, and apparently with very satisfactory results.

Moving Paint Gangs

What is the most satisfactory and economical method for getting paint gangs, including material and equipment, to and from work?

Trucks Are Best

By E. C. Neville
Bridge and Building Master, Canadian National, Toronto, Ont.

As a result of reduced earnings during recent years, the railways have considered it necessary to curtail their painting programs sharply, doing the minimum amount of painting, that is, doing only those jobs that were absolutely necessary for the preservation of the property. This situation has naturally caused maintenance officers to give much study and consideration to the most economical methods of performing this class of work which, obviously, has included the movement of the paint gangs, their material and equipment, to the various jobs with the least delay and loss of time.

My own experience in moving paint gangs with their equipment and materials over the line to paint stations and other buildings usually grouped in station yards has been to move boarding and equipment cars in local freight trains from one point to another. This method involves considerable lost time, however, in waiting on train movements, unless the work is well planned. For instance, where a job has been completed at one point by about the middle of the day and no train is available to move the cars to the next point for several hours, the foreman should move his gang to this point, provided it is not too distant, and start work, while his cars follow on the first train. If a motor truck is available for this movement, this will be by far the best method of transportation; besides it will keep the motor car off the line.

For the smaller stations, which have only a few adjoining small buildings, such as section tool houses, crossing shanties, etc., the most economical method of moving paint gangs has been found to be by motor truck. A two-ton truck with a stake body can handle a small gang with the necessary equipment and material, including a paint spray outfit.

In most cases, the truck can be driven close enough to any of the buildings so that the painting can be done without unloading the spraying outfit. The driver can move the truck around the building as the painting progresses, at the same time operating the spraying compressor, thus releasing one man for cleaning or other work. This method of transportation is exceptionally economical in large terminals where there are always a large number of small buildings, some of them isolated and some so situated with respect to surrounding buildings in the vicinity that their appearance is of importance and they must be kept painted. When this situation exists, two painters with a motor truck carrying their ladders and a paint-spraying outfit can paint several of these buildings in a short time at small cost.

The painting of bridges at outlying points presents an entirely different problem. In most cases, these jobs take considerable time, and this requires that the gang be held at one point while the job—often involving several structures in the same vicinity—is under way, in which event the boarding and outfit cars should be placed at the nearest station or siding and a portable shelter erected at the bridge, in which tools and materials can be stored safely for the duration of the job. Provision can then be made to transport the men between the outfit and the work by either motor car or motor truck.

Conditions Have Changed

By Supervisor of Bridges and Buildings

Only a little more than a decade ago, painting was a relatively large item in our bridge and building maintenance, and we were able to keep one gang employed the year round on the division on which I am located, and we always had two and sometimes three such gangs during the warm months. At that time transportation was not a problem, for we provided boarding and material cars and provided the gang with a motor car. Local freights ran daily and the camp outfit was moved when desired so that the men, using the motor car, were able to work with practically no lost time.

At that time the gang worked out of face, that is, when it went to a station every building was cleaned and painted. At the smaller places this included both exterior and interior work; at the larger ones, only the ex-

terior. It was not uncommon to skip a station that did not need to be painted, but when the gang reached the end of the district, every building that was ready for paint had been painted.

Today the situation is entirely different; we are painting only where we are compelled to do so and, I might add, are doing that reluctantly. As a result of this, as I believe, mistaken policy, I now have one small gang of painters, only about half of my normal winter force of a few years ago. Local freight trains have been eliminated on some lines and l.c.l. merchandise is now handled by trucks; on other lines they run on alternate days or, in some cases, twice a week.

Obviously, the outfit cannot be handled with any degree of effectiveness if reliance is placed on train service. Motor cars are not suited to handling ladders, and I hesitate to allow a small paint gang to operate both a motor car and trailer. To avoid wasted time, I have assigned a three-ton motor truck to this gang. With this equipment the gang has a working radius of about 25 miles from its outfit cars without loss of time. We have been able to get the cars moved at the intervals required, which in general is once or twice a week. The overall cost of this system of transportation is less than it would be with the motor car, and we are able to handle a paint spray outfit, which would be difficult without using a motor-car trailer.

There are some instances where the plan does not work out so well in painting bridges, for it is sometimes difficult or impracticable to reach these structures with a motor truck. So far, where this has occurred, we have been able to arrange for the section gang to handle our material and equipment for us, from the nearest highway crossing, so that the scheme as a whole has proved to be satisfactory and an economical solution.

Heat-Treated Nuts for Frogs

Are there any advantages in the use of heat-treated nuts on frog and crossing bolts? If so, what?

Have Advantages

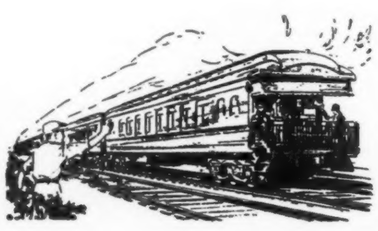
By District Engineer

This is a subject that has been fruitful of discussion for a number of years, and maintenance officers are not yet agreed whether the nuts for use on frogs and crossings should be heat treated or whether they should be used without treatment. It has not been many years since frog and crossing bolts were not heat treated. At that time it was practically impossible to keep a frog or crossing tight for any length of time. The longer they remained in the track the harder it became to keep the bolts tight and it was not uncommon to see several bolts in a crossing—and sometimes in a frog—with the nuts run off, a condition that would not be tolerated today.

Eventually, heat-treated bolts came into common use, with the result that conditions were very much improved, and while it is still difficult to keep bolts tight in frogs and crossings, the situation today is far better than formerly. Observation indicates that when a bolt gets loose it begins to wear at a rate considerably greater than when it was tight. It is also observed that as the bolt wears it becomes increasingly difficult to keep it tight. Likewise, occasionally, when a bolt has broken out of a crossing and has been replaced temporarily with one of too small a diameter, it has been noticed that the same trouble has followed, that is, increased tendency for the bolt to get loose.

Two conclusions can be drawn from these observations, the first of which is that bolts for frogs and crossings should be made to a precise fit when the crossing is assembled; and the second is that if sufficient care is ex-exercised to keep the bolts well tightened, the wear on the bolt will be at the minimum and it will be less difficult to keep it tight. This then opens the question of the probable advantage of heat treated nuts. The bolts used in frog and crossing assemblies today are invariably heat treated, while, in general, the nuts are not. This means that the carbon content of the bolt is higher than that of the nut and that as a result of the higher carbon and the heat treatment, the metal in the bolt is considerably harder than that in the nut.

In some quarters at least, there has been a belief that the metal in the nut should be softer than that in the bolt, so that if the bolt is over stressed in tightening, the threads in the nut rather than those in the bolt will be damaged. If one will examine the threads on a nut from a crossing that has been tightened repeatedly, he will notice that there is some deformation of the threads on the side of the bolt that bears against the crossing and that the first one or two threads are somewhat distorted, so that they are not fully effective. To my mind this indicates rather definitely that the metal in the nuts is too soft.



There is one consideration that should not be overlooked in a study of this subject. Crossing bolts, particularly, are of large diameter and the nuts for them must be thick. Obviously, it will cost less to make a nut from soft metal than from metal that is harder. The number of nuts for crossing bolts that any individual road would be required to buy for replacement purposes in any year is relatively small, however, so that this can be dismissed. From what information I have been able to gather, those roads that have used heat-treated nuts for their frog and crossing bolts have found a real advantage in doing so, for it is easier to keep the bolts tight and the life of both bolts and nuts is increased materially. My own observation indicates that while a nut made of harder metal than the one now in use for frogs and crossings is desirable, it should not have the same degree of hardness as the bolt itself.

Sees No Value

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

It is far better to have the component parts of frogs and crossings milled or ground to a precise fit than it is to attempt to correct this lack of precision in fit by placing undue tension on the bolts. When the latter is done, the frog or crossing is handicapped from the start, irrespective of how strong the bolts and nuts are. Under heavy traffic, such frogs or crossings will get loose and the looseness will be more pronounced where the support is weakest.

It is a fact that in such cases the looseness is first evidenced by the condition of the bolts, and since the bolts can be tightened by screwing up the nuts, it may be natural to conclude that the weakness of the nuts is the sole cause of the trouble. This is not true, however. Evidence that it is not can be shown by the fact that on motive power, where there are many

bolted connections, it has been found that nuts that are not heat treated will develop the proper tension in heat treated bolts, and will stay tight if the bolted parts have a precise fit. Loose frogs and crossings will not be prevented or corrected by heat treating the nuts on the bolts.

Can Sweating Be Overcome?

When painting steel tanks in warm weather, how can the tendency of the steel surface to sweat be overcome? What effect does it have on the paint?

Has No Trouble

By W. L. Curtiss
Mechanical Engineer, New York Central, New York

It is a well-known fact that paint will not adhere to a moist surface and I do not know of any practical method of preventing the sweating of steel surfaces. Sweating is the result of definite atmospheric conditions. When the steel is cooler than the air, as is generally the case during the forenoon, and the relative humidity is high, the air next to the steel becomes chilled to the temperature of the steel and its relative humidity becomes 100 per cent. Precipitation to the steel surface then occurs, and this is known as sweating.

We find no difficulty in selecting a time for painting when sweating does not occur, and it seems that this should be possible in most climates, except where the humidity remains relatively high for long periods.

Cannot Be Stopped

By Supervisor of Bridges and Buildings

I consider this an unusually practical question, although, so far as I know it is one that has received very little discussion. There is no mystery about sweating, for it is a natural phenomenon which occurs frequently during the warm months. It is not confined to steel water tanks, but can be seen on almost any vessel into which cold water has been poured. Because it is a natural phenomenon, nothing can prevent it.

All air contains some moisture, but the amount it can contain depends on its temperature. The amount of water vapor in the air at any given time is termed the absolute humidity. The ratio between the absolute humidity and the amount of moisture the air is capable of containing is designated the relative humidity. Air may be completely saturated at a given temperature, that is, it may have a relative humidity of 100 per cent at that temperature; yet, by raising the temperature of the air, without adding or subtracting any water, the relative humidity can be brought down to 40, 30 or 20 per cent or even less. In other words, with no change in the absolute humidity, there can be a wide range in the relative humidity.

Conversely, with no change in the absolute humidity, the relative humidity will be increased if the temperature of the air is reduced. Again, for every degree of absolute humidity there is a temperature at which the relative humidity will be 100 per cent. This is called the dew point, for any reduction in the temperature of the air, no matter how slight, will cause some of the water vapor to condense and be precipitated.

If the relative humidity is high and the tank contains water that is colder than the air, the film of air next to the surface of the tank will be chilled and will deposit some of its moisture on the surface in the same manner as dew is deposited during the night. As this film of air is chilled, a convection current is set up, the cooled air moves downward and warm moisture-laden air takes its place and thus adds its moisture to that already condensed on the surface. If humidity persists and the surface of the tank is colder than the air, the sweating will continue.

These facts, then, suggest the procedure to be followed. Obviously, so long as the humidity persists and it is necessary to pump the colder water into the tank, the sweating will persist and there is nothing that can be done to overcome the tendency of the steel surface to sweat. On the other hand, there are many times during the summer when the humidity is low, and periods of low humidity are still more common during the fall. For this reason, I have always planned to paint my tanks during the fall, including both the steel and wooden types.

In the fall there will be many days during which the temperature of the air will be approximately equal to or lower than that of the steel surface, in which event sweating will not occur. Again, with a low relative humidity, the dew point will be so low that even if the temperature of the tank surface is considerably below that of the air, no condensation will take place and there will be no sweating. Answering the last part of the question—paint cannot be made to adhere to a moist surface, and painting a sweating surface is impracticable.

What Kind of Flooring?

What kind of flooring is most suitable for a shop in which heavy materials are handled? What are the advantages?

Prefers Concrete

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Based on an experience of many years and which has included a wide variety of flooring materials for service in shops, in which both heavy and light materials are handled, we have become convinced that the most economical and suitable flooring for all conditions is concrete, provided it is mixed and placed according to the best practice in this respect. If by reason of abuse or unusually heavy service at some point or points in the shop, the surface of the concrete chips, is pitted or otherwise damaged, it can be repaired easily by any one of several improved methods now available.

In many instances we have used wood blocks on concrete foundations but they display a tendency to become loose and sometimes split, which creates a rough floor for handling heavy materials with trucks, and may make it hazardous to work over. We have also tested thoroughly various kinds of asphalt floors, including blocks and continuous sheets, but no floor has given the satisfactory results that we have obtained from well-made concrete. Our mechanical department forces concur in our belief, but we have found it necessary to provide timber matting that can be removed easily for scrubbing, for machinists and others who must stand continuously at their machines.

It is also our experience that the concrete floor is the most sanitary, it presents no fire hazard and it can be maintained and kept clean most economically. It is necessary to provide a concrete or heavy timber base for both asphalt and wood blocks, at a cost comparable to that of the finished concrete floor. For this reason and those already given, it is our present intention to continue the use of concrete floors.

Depends on Shop

By Frank R. Judd
Engineer of Buildings, Illinois Central, Chicago

The answer to this question will depend in large part on which shop is under consideration, that is, on the class of work to be performed. In machine and boiler shops, where machine-tool work is performed and there is not an unusual amount of trucking, wood blocks laid on a heavy concrete base make an excellent floor. Treating the blocks with a preservative adds greatly to their service life. The amount of treatment can differ for the blocks for inside use and those exposed to the weather around exterior doorways or other openings.

For blacksmith shops and foundries, the floor should consist of well-compacted sand or cinders, with trucking aisles of concrete so located as to permit the effective handling of materials to the several parts of the shop.

In storage buildings, iron sheds, flue shops and buildings used for similar purposes, concrete floors will generally be quite satisfactory. Where these floors are subject to trucking, they should be finished with special hardeners, of which there are many on the market, to prevent dusting. If heavily loaded steel-tired trucks are in use, the service life of the floor can be increased materially by embedding a metal grid or grating in the floor, as the metal will take most of the wear and will prevent the concrete from cracking and disintegrating.

In wheel shops or buildings used for comparable purposes, where heavy equipment must be moved across the floor, compressed asphalt blocks laid on a heavy concrete base provide a durable wearing surface. They are resilient and, being highly compressed, are tough and resistant to wear.

How to Cut Brush

When cutting the right of way, is there any advantage in cutting brush and tree seedlings below the ground surface? Why?

Not to May Cause Delay

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

The track mowers we now operate have extension sickle bars to permit the weeds to be cut clean for a distance of 18 ft. on either side of the track. This requires a second operation over the track, for the main and extension bars cannot be operated simultaneously. If the stumps of brush and tree seedlings that are growing in this 18-ft. zone are not cut off at or below the surface of the ground much delay to the mowing operation may be created, and the machine may be damaged, for it is seldom that the stubs can be seen by the operator. Recently, we experienced a serious delay to the mowing operation because brush stumps had been left too high and interfered with the machine. Eventually it became necessary to employ additional forces to work ahead to remove the obstructions that were fouling the blades of the machine.

There is also an advantage in the labor that can be saved, and in eliminating the unsightly appearance of the right of way where these stubs are left. Most important, however, grubbing to keep the stubs below ground discourages or kills growth and the brush can be eliminated eventually by grubbing, which both improves the appearance of the right of way and reduces the cost of weed eradication.

Grubbing Is Essential

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Grubbing is essential to keep the right of way neat, particularly if it is to be done economically. Much brush and many trees have about the same growth below as above the ground. The underground parts will be stimulated to unusual activity in providing food for the expansion of the components above ground if the plant is trimmed or cut off above the ground surface. This makes the cost of mowing brush and seedlings exceed the cost of careful grubbing at the proper time.

Grubbing should be done when the plant is inactive after the growing season is over. This is also the time when constructive track work is completed. For this reason, a section gang, no matter how small, can find time to do a good job of grubbing. The supervisor should see that this is done.

Recommends It

By Thomas Walker
Roadmaster, Louisville & Nashville, Evansville, Ind.

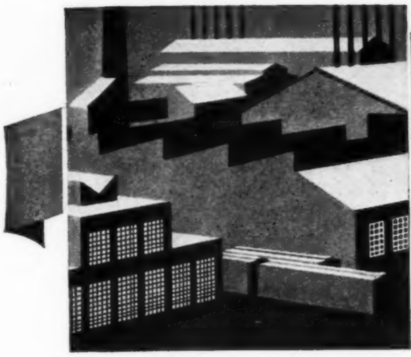
It is desirable to cut brush and tree seedlings below the ground surface, so far as this can be done economically since it tends to discourage the growth to a greater extent than if the cutting is done above the ground. Certain kinds of shrubs will send up new growth unless they are cut off below the ground, but if cut below the ground they will die and thus be disposed of. Again, where the cutting is above the ground, a stub is left that may interfere with hand cutting or mowing machines.

In general, it is advantageous to cut the brush of tree seedlings in advance of the hand or machine mowing. Cutting below the ground surface will cost a little more than cutting above the ground, but the additional expense is well worth while. A mattock or grubbing hoe is a good tool for this work, although in some cases an ax is also desirable.

Should Be Done

By J. B. Bragg
Section Foreman, Chesapeake & Ohio, Prince, W. Va.

I consider it important that brush and tree seedlings be cut off below the ground, especially in hilly country. Most of the shrubs that grow so persistently on the right of way will sprout new growth quickly if any part of the stump is left above ground, and will give the same trouble next season. If stubs are left above the ground they interfere with both scythes and sickle bars; after the weeds have been cut and burned, the old stubs present anything but an attractive appearance. I recommend grubbing these plants in the early winter before the ground is frozen, for two reasons: (1) the plant is then inactive and is more easily killed; and (2) trackwork is also less active, and the time can be spared better.



Products of Manufacturers

Portable Printer

THE Ozalid Corporation, Johnson City, New York, has developed a new Elpro portable printer which is designed especially for use where a limited number of small prints are required. This printer is housed in a substantially-built case with a gunmetal wrinkle finish. The light source consists of six specially-designed lamps with a total of 850 watts, which are rated at 100 hr. These lamps are mounted on a highly polished aluminum reflector which is said to be scientifically designed to assure uniform light distribution over the entire printing surface.

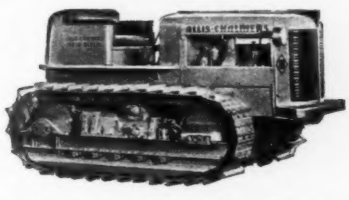
The new printer embodies a hinged printing frame for holding the original sheet in contact with the sensitized paper against the glass. A time switch automatically turns off the lights when the desired exposure has been completed. The dry developing chamber is located behind the reflector; thus the heat generated by the lights is utilized to vaporize the developing agent (ammonia in water).

This printer operates on an ordinary lighting circuit of 110 volts, and on either alternating or direct current. It produces prints having a maximum size of 12 in. by 18 in. Prints can be made in five to nine minutes, depending on the translucency of the sheet from which they are being reproduced. It is pointed out that the new printer is ideally suited for use by drafting rooms, field offices, and similar places in instances where a limited number of small prints are needed.

The New Elpro Portable Printer, Is Housed in a Substantially-Built Case

Allis-Chalmers Diesel Tractor

THE Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has developed a Diesel crawler tractor, the HD10, a companion model to the HD14, which is designed to handle two- and four-wheel scrapers up to 10 cu. yd. capacity, 12-ft. blade graders, bulldozers, trailbuilders, winches and other allied equipment. The HD10 is available in two tread widths, 62 and 74 in., with the narrow model weighing 19,900 lb., and the wide model weighing 20,700 lb. It is powered with a four-cylinder General Motors two-cycle Diesel engine, which develops 95 belt hp. and 79.0 drawbar hp. The engine is designed with unit injection and four way cooling and is said to provide fast acceleration, smooth power and easy starting, and to be engineered for high performance at low cost. Other features of the tractor include velve-touch bimetallic steering clutches and brakes,



The Allis-Chalmers HD 10 Diesel Crawler Tractor

Positive-Seal wheel trucks, an extra-heavy crankcase, electric starting and lighting, and constant mesh gears, with six forward speeds ranging from 1.58 to 6.03 m.p.h., and two reverse speeds. It is said the engine of this tractor can be throttled down to almost half engine speed without losing drawbar pull, which reduces gear shifting and lost time.

Waterproofing for Buildings

THE Flexrock Company, Philadelphia, Pa., has introduced a new water-proofing compound for application to the exterior surfaces of masonry buildings. This compound, which is called Flexseal, is said to be basically the same as the material that is used for waterproofing airplanes, except that it is so altered as to adapt it for application to concrete, brick, stone and other building materials. The material is composed of nitro-cellulose, lacquer, oils and solvent.

Flexseal is transparent, and is said to take the color of the surface over which it is applied. Both old and new buildings can be waterproofed with the material, which is applied with a brush in the same manner as paint. It is claimed that the compound has penetrating qualities, and that at the

same time it has the necessary "body" to permit it to fill any pores, open spaces or other voids in the surface to which it is applied.

Buda Inspection and Passenger Rail Cars

THE Buda Company, Harvey, Ill., has developed a line of passenger and official inspection cars, of which the inspection cars are available in capacities of 8 and 12 persons and the passenger cars are available in capacities of 8, 12, 16 and 20 persons.

The cars consist of all-steel streamlined bodies mounted on a chassis with a 6-in. steel channel-type frame and a 4- or 6-cylinder Buda automotive-type engine. The size of the engine varies with passenger capacity and service requirements. The bodies are of double wall construction and are completely padded from the chassis by live rubber insulation. The seats are of the tubular steel frame bus type, covered with genuine leather upholstery and may be arranged for service requirements.

The frame is supported on wide leaf-type springs with Buda patented thrust plates, and the axles are equipped with Timken roller bearings. The transmissions are geared for operating the car in three or four speeds in either forward or backward direction. Each car is provided with full safety and control features, including a full width, two-piece V-type windshield; automatic windshield wipers with handles for emergency operation; rain visor; non-glare rear vision mirror and an instrument panel with a complete set of gauges.

The official inspection cars differ from the passenger cars in the arrangement of seats and the design of their bodies, the inspection cars having rear wide windows and no rear doors. The inspection car is provided with table-high shelves placed across the front and rear for the convenience of inspectors making notes and the seating arrangements are so designed that officers can sit at each of the corners and face the track. The passenger cars are slightly more streamlined, have a different seating arrangement and one rear door.

These cars are said to provide exceptionally smooth riding, to be capable of maintaining full speeds continuously and to operate with an extremely low fuel cost.

One of the Streamlined Official Inspection Cars Which Are Available in Capacities for 8 or 12 Persons

Stanley Soldering Irons and Armor Clad Tips

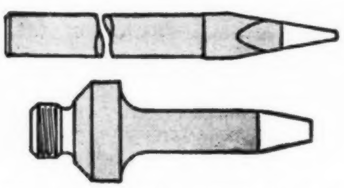
STANLEY Tools, New Britain, Conn., a division of the Stanley Works, has developed a new line of plug-tip electric soldering irons and a complete line of Armor Clad tips for the screw-tip and plug-tip types of soldering irons manufactured by this company.

The new line of soldering irons have plug tips, which fit into the heating head of the iron and are held in place by a screw. The screw permits

A Stanley Plug Tip Soldering Iron

easy adjustment and removal of the tip and the plug tips are said to be relatively inexpensive as compared to screw tips. The plug tips are available for these soldering irons in two types; copper and Armor Clad.

The Armor Clad tips, which are available for the screw-tip and plug-tip Stanley soldering irons, consist of a copper tip with a thin special protective metal coating. It is said that this coating does not reduce the high heat conducting value of the copper tip, that it protects the copper tip from oxidation and corrosion, that there is no erosion because the solder does not amalgamate or alloy with the



Two Types of the Armor-Clad Tips

protective coating, that it can be readily tinned and, because of these properties, that it will wear well and outlast plain copper tips many times.

New Books

A. R. E. A. Proceedings

PROCEEDINGS of the American Railway Engineering Association for 1940—1045 pages, 6 in. by 9 in. Bound in cloth or half Morocco. Published by the association, 59 East Van Buren Street, Chicago. Price, cloth $8, half Morocco $9.

The current volume of the proceedings contains a complete record of the work of this association for the year 1939-1940, ending with the activities of the forty-first annual convention, held in Chicago on March 12, 13 and 14, 1940. It also includes the addresses by C. H. Buford, vice-president, operations and maintenance, and Judge R. V. Fletcher, vice-president and general counsel, Association of American Railroads.

The committee reports, which are presented in full, together with the discussion, cover a wide range of subjects, providing valuable reference material on railway engineering, maintenance and operation. In the reports of the 27 standing and various special committees, a total of 117 subjects were covered, including the construction of piers in various kinds of water; the effect of modern equipment and machines on bridge gang organization and efficiency; tie renewal averages and costs; the use of asphalt in ballast; curve spirals for high speed train operation; specifications for the thermal treatment of rail; the economic value of different sizes of rail; the standardization of parts and accessories for motor cars; oxy-acetylene track welding equipment; methods and practices of lining and relining tunnels; and fastenings for timber structures, including the various types of metal joint connectors.

NEWS of the Month

Budd Urges Railroads to Reduce Bad Order Cars

In a progress report submitted to the President on July 16, Ralph Budd, transportation member of the National Defense Advisory Commission, said that carriers had been urged to keep the proportion of bad order cars down to six per cent of the total "by full performance by all lines of the repair work necessary." Mr. Budd added, "Concrete recommendations have already been drawn up for the acquisition of very substantial numbers of special rolling stock for handling troops and their equipment. Conferences have been held with representatives of railway car shops in Illinois, Indiana, Missouri and Pennsylvania to discuss costs and types of cars."

36,852 New Freight Cars Put in Service in First Half of 1940

Class I railroads put 36,852 new freight cars in service in the first six months of 1940. This was the largest number installed in any corresponding period since 1930 when 49,208 new cars were put in service. In the first half of 1939, there were 8,628 new freight cars installed. Of the total number of new freight cars placed in operation in the six months period this year, coal cars numbered 19,076; box, 16,007; refrigerator, 595; flat, 569; stock, 88 and miscellaneous, 517.

At the same time, the railroads installed in service 180 new locomotives, of which 45 were steam and 135 were electric and Diesel-electric. This compares with 126 new locomotives installed in the first half of 1939, of which 16 were steam and 110 were electric and Diesel-electric.

Says Railways Need 500,000 New Cars

According to a study recently completed by R. N. Janeway for the National Resources Planning Board, and now being distributed among government and other circles for confidential review and criticism, the railroads face the necessity of acquiring 500,000 new freight cars between now and the end of 1942. This estimate would require the construction of cars at a rate of 200,000 per year. During the last 25 years the maximum output was 176,000 cars in 1923, while not since 1925 have as many as 100,000 cars been built annually.

The Janeway report is understood to be based on the Federal Reserve Board index of industrial production. An analysis has recently been made by the Bureau of Railway Economics, to show that the Federal Reserve Board index is not a proper one for correlating with carloading figures.

President Postpones Threatened Express Strike

On July 10, two days before the employees of the Railway Expressing Agency were due to walk out on strike, President Roosevelt postponed such action at least 60 days by issuing a proclamation creating an emergency board under the Railway Labor Act to investigate and report on the disputes which gave rise to the strike call. The emergency board appointed by the President comprises: Professor Henry A. Millis, University of Chicago; Professor Dexter M. Keezer, President of Reed College, Portland, Ore.; and Hon. John P. Devaney, former chief justice of the Minnesota State Supreme Court. The Brotherhood of Railway Clerks had made a demand upon the Agency for a 44-hour week for all express employees represented by it throughout the United States, covering some 35,000 men. The suggested reduction in the work week from 48 to 44 hours would increase the payroll cost of the Agency by 5 to 6 per cent, or 4 to 4½ million dollars a year.

A. C. L. Ordered to Pay $260,000 Restitution

The Atlantic Coast Line has been ordered to pay restitution in excess of $260,000 to more than 3,500 maintenance of way employees as the result of a suit brought by the Wage and Hour division of the U. S. Department of Labor. In its complaint, the Wage and Hour division charged the railroad with deducting from the pay of its maintenance of way employees unreasonable sums for the rental of houses, "many of which were non-existent and others unfit for human habitation."

Under the terms of the judgment, the railroad may make deductions from the pay of its employees for the reasonable cost to the company of housing facilities voluntarily accepted and actually lived in by any such employee on October 23, 1938, and who continued to live therein. Another provision in the judgment is that no deduction may be made for housing unless sanitary facilities and water supply are reasonably accessible and are kept in a reasonable state of repair. If such supplies are separated by a railroad main line or actively used switching tracks, they shall not be deemed to be reasonably accessible.

In Washington, D. C., Colonel Philip B. Fleming, Wage and Hour Administrator, said that the restitution involved in this case was the largest in any yet investigated by the Division.

College Training for Transportation Service

On June 24, the Society for the Promotion of Engineering Education devoted a session of its annual convention at Berkeley, Cal., to consideration of training for transportation service under the direction of its Transportation committee, headed by Elmer T. Howson, editor of *Railway Engineering and Maintenance*, as chairman, who is also chairman of a committee of the American Railway Engineering Association to develop a closer liaison between the railways and the colleges and universities to further the training of young men for railway service.

The session included addresses as follows: What a Railway Expects in the Engineering Graduate, by Col. J. W. Williams, chief engineer, Western Pacific; What the Railways Offer the Engineering Graduate, by M. C. Blanchard, chief engineer, Atchison, Topeka & Santa Fe, Coast Lines; After Graduation—What?, by W. H. Kirkbride, chief engineer, Southern Pacific System; and What the Highways Offer the Engineering Graduate, by John J. Skeggs, Division of Highways, State of California.

Department of Justice Sues the Pullman Company

On July 12, the Department of Justice filed in the Federal District Court at Philadelphia, Pa., a complaint under the federal anti-trust laws against the Pullman Company and its affiliates and officers. Assistant Attorney General Thurman Arnold, in announcing the suit, stated, "The substance of the complaint is that the Pullman organization has prevented the railroads from using modern, light-weight, streamlined cars manufactured by competing companies in order to maintain in service its own obsolete equipment. It is charged in effect that the dominant position of the Pullman organization has given it power to force on the railroads restrictive contracts which compel them to use Pullman-built-and-operated sleeping car equipment exclusively, or it cannot be used at all. It is alleged that the railroads and the traveling public have been denied the widespread use of modern equipment by the monopolistic practices of the Pullman organization."

Association News

B. & B. Supply Men

Officers of the Bridge and Building Supply Men's Association are developing plans for their exhibit to be held concurrently with the convention of the American Railway Bridge and Building Association at the Hotel Stevens, Chicago, on October 15-17. Secretary W. B. Carlisle, the National Lead Company, 900 West 18th street, Chicago, is now sending literature and application blanks to interested companies.

Metropolitan Maintenance of Way Club

With 98 members and guests in attendance, the annual outing of the club was held at the Houvenkopf Country Club, Suffern, N. Y., on June 27. The day's activities included golf, soft ball, quoits and cards, prizes being presented for the best performances in all sports. Following dinner, which was served in the early afternoon, a brief meeting was held during which a resolution was adopted eulogizing W. H. Armstrong, manager of tie tamper sales, Ingersoll-Rand Company, for his contributions to track maintenance. Mr. Armstrong is to retire on September 1.

Track Supply Association

Forty-nine companies have already contracted for 69 spaces for the exhibit to be presented concurrently with the convention of the Roadmasters Association at the Hotel Stevens, Chicago, on September 9-12. In addition to the companies listed in the June issue, page 406, and in the July issue, page 466, the Western Railroad Supply Company, Chicago, has arranged for space. The number of companies and the amount of space taken to date materially exceed the corresponding figures for the convention a year ago. Further applications should be addressed to Lewis Thomas, secretary-treasurer, Track Supply Association, 59 East Van Buren street, Chicago.

F. O. Whiteman

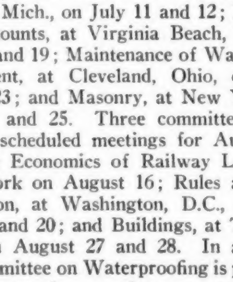
F. O. Whiteman, whose election as secretary of the Roadmasters' and Maintenance of Way Association of America and of the American Railway Bridge and Building Association, with headquarters at Chicago, was announced in the July issue, was born in Columbus, Kan., on November 10, 1878, and entered railway service in September, 1897, as a brakeman on the Atchison, Topeka & Santa Fe at Winslow, Ariz. In January, 1899, he left the Santa Fe to become auditor and cashier of the Roswell Land & Water Co., Roswell, N. M., but returned to railroad service in April of the following year as an agent for the Colorado & Southern at Lawson, Colo. A few months later, Mr. Whiteman went with the Chicago & Eastern Illinois as a train dispatcher at Danville, Ill., and in January, 1905, he returned to the Santa Fe as a train dispatcher at Dodge City, Kan. In November, 1905, he went with the Rock Island as chief dispatcher at Trenton, Mo., and in September, 1907, he was promoted to trainmaster at El Dorado, Ark., later being transferred to El Reno, Okla., Trenton and Manly, Iowa. In February, 1914, he went with the Baltimore & Ohio as chief dispatcher at Cleveland, Ohio, and a year later he was promoted to terminal trainmaster at Newark, Ohio, later being transferred to Willard, Ohio. Mr. Whiteman became assistant superintendent on the St. Louis Southwestern at Illmo, Mo., in May, 1917, and in February, 1918, he became general superintendent of transportation of the East St. Louis & Suburban, with headquarters at East St. Louis, Ill. In September, 1929, he was appointed assistant general superintendent of the Chicago, South Shore & South Bend, with headquarters at Michigan City, Ind., retiring a year later. Since June, 1931, Mr. Whiteman has served as secretary-treasurer of the American Association of Railroad Superintendents.

F. O. Whiteman

American Railway Engineering Association

Five committees of the American Railway Engineering Association held meetings during the month of July as follows: Waterways and Harbors, at Chicago on July 11; Iron and Steel Structures, at Detroit, Mich., on July 11 and 12; Records and Accounts, at Virginia Beach, Va., on July 18 and 19; Maintenance of Way Work Equipment, at Cleveland, Ohio, on July 22 and 23; and Masonry, at New York on July 24 and 25. Three committees have already scheduled meetings for August as follows: Economics of Railway Labor, at New York on August 16; Rules and Organization, at Washington, D.C., on August 19 and 20; and Buildings, at Toronto, Ont., on August 27 and 28. In addition, the Committee on Waterproofing is planning to hold a meeting on a date not yet selected.

The Board of Direction will meet in Chicago on August 22. The General Committee of the Engineering division, will meet in Chicago on the following day, August 23. The principal business before these committees is the preparation of the budget for 1941.



The Proceedings of the forty-first annual convention, held in Chicago on March 12-14, have come from the printer and were distributed to the members during the month. Bulletin No. 418, containing the Seventh Progress Report of the Committee on Stresses in Track, the Sixth Progress Report on Transverse Fissures, the Second Progress Report on Continuous Welded Rail, the Tie committee's statistics of 1939 tie renewals, and nine additional trackwork plans, was distributed to the members late in July. A revised edition of the Portfolio of Trackwork Plans, containing 24 revised plans approved at the last convention, is now in the hands of the printer and will be available in August. The supplement to the Manual, incorporating action taken at the 1940 convention, has been set in type and is now in the hands of the General committee for approval preliminary to its distribution to the members.

Bridge and Building Association

The Executive committee met in Chicago on July 15, with President A. E. Bechtelheimer, Vice-President H. M. Church, Secretary F. O. Whiteman, Treasurer F. E. Weise, Director A. M. Knowles, Past President Armstrong Chinn, T. H. Strate, and Elmer T. Howson, and Committee Chairman R. E. Caudle in attendance. Harry A. Wolfe, president and W. B. Carlisle, secretary, of the Bridge and Building Supply Men's Association also attended the meeting for a short time.

The program for the convention to be held at the Hotel Stevens, Chicago, on October 15-17, was presented and the committee instructed to arrange details. Ten applications for membership were approved. The meeting then reviewed in detail tentative reports prepared by committees for presentation at the convention, and offered numerous suggestions for incorporation in the final drafts of these reports.

Roadmasters Association

The program is now practically completed for the fifty-fifth annual convention, which will be held at the Hotel Stevens, Chicago, on September 10-12. The program is as follows:

Tuesday, September 10

Morning Session—10:00 A.M.

Convention called to order
Invocation
Opening address by C. E. Johnston, chairman, Western Association of Railway Executives, Chicago
Greetings from the American Railway Engineering Association, G. S. Fanning (chief engineer, Erie), President
Greetings from the American Railway Bridge and Building Association, A. E. Bechtelheimer (assistant engineer bridges, C. & N. W.), President
Greetings from the Track Supply Association, R. J. McComb (vice-president, Woodings-Verona Tool Works, Verona, Pa.), President

Address by President G. L. Sitton (chief engineer maintenance of way and structures, Southern, Charlotte, N. C.)

In memory of C. A. Lichty—Brief addresses by Elmer T. Howson, past-president; Armstrong Chinn, past-president; and Lewis Thomas, secretary, Track Supply Association

Report of Committee on Slow Orders—Their Use in the Light of Present-Day Operating Conditions; E. L. Banion, chairman (roadmaster, A. T. & S. F., Marceline, Mo.)

Afternoon Session—2:00 P.M.

Report of Committee on Ditching and Bank Widening—Methods and Equipment Best Suited for This Work; C. Halverson, chairman (division roadmaster, G. N., Grand Forks, N. D.)

Address on The Simplification of Track Work, by C. H. R. Howe, cost engineer C. & O., Richmond, Va.

Adjourn at 4:00 P.M. to visit exhibit of Track Supply Association

Tuesday Evening—8:00 P.M.

An Evening with Work Equipment

Address on Making Work Equipment Work, by J. G. Hartley, assistant engineer, Penna., Philadelphia, Pa.

Moving pictures of work equipment in action

Wednesday, September 11

Morning Session—9:30 A.M.

Report of Committee on Welding—Its Uses in Track Work; R. L. Fox, chairman (roadmaster, Southern, Alexandria, Va.)

Address on It's Results That Count, by A. E. Perlman, engineer maintenance of way, D. & R. G. W., Denver, Colo.

Report of Committee on The Maintenance of Gage—Its Importance under Today's Higher Speeds—Causes and Effects of Irregular Gage—Means of Correcting; W. E. Heimerdinger, chairman (district maintenance engineer, C. R. I. & P., Des Moines, Iowa

Afternoon Session—2:00 P.M.

Report of Committee on Effect of Weight of Rail on Track Maintenance; I. H. Schram, chairman (engineer maintenance of way, Erie, Jersey City, N. J.)

Address on The Task of Renewing 50,000,000 Ties a Year, by H. R. Clarke, engineer maintenance of way, C. B. & Q., Chicago

Question Box—For the discussion of practical questions on track maintenance submitted from the floor

Adjourn at 4:00 P.M. to visit exhibit of Track Supply Association

Wednesday Evening—6:30 P.M.

Annual dinner given by the Track Supply Association

Thursday, September 12

Morning Session—9:30 A.M.

Report of Committee on Handling Snow and Ice in Terminals and on the Line—Organization, Equipment and Methods; P. Chicoine, chairman (roadmaster, Can. Pac., Vaudreuil, Que.)

Closing business

On Thursday afternoon plans are being perfected for an inspection of a large plant in the Chicago district making materials used by track forces.

Personal Mention

General

W. H. Oglesby, track supervisor on the Southern with headquarters at Camden, S. C., has been promoted to assistant trainmaster, with headquarters at Somerset, Ky.

F. J. Liston, roadmaster on the Montreal Terminals division of the Canadian Pacific, with headquarters at Montreal, Que., whose appointment as acting assistant superintendent of the Montreal Terminals division, with the same headquarters, was announced in the February issue, has been promoted to assistant superintendent of the Montreal Terminals division.

Lawrence S. Jeffords, superintendent and engineer, maintenance of way, of the Charleston & Western Carolina, has been promoted to general superintendent, with headquarters as before at Augusta, Ga. Mr. Jeffords was born on July 2, 1892, at Florence, S. C. He attended Clemson College and entered railroad service in the engineering department of the Atlantic Coast Line in March, 1910; later being promoted successively to rodman, instrumentman and resident engineer. Mr. Jeffords held other positions on the Atlantic Coast Line, including roadmaster, superintendent-steam shovel, and assistant engineer maintenance of way. On January 1, 1921, he went with the Charleston & Western Carolina as engineer maintenance of way, being promoted to superintendent on January 1, 1925, the position he held at the time of his recent appointment. During the first World War, Mr. Jeffords was assigned from an officers' training camp to special railroad duty at Savannah, Ga.

Lawrence S. Jeffords

James L. Cranwell, whose appointment as superintendent of the Monongahela division of the Pennsylvania, with headquarters at Pittsburgh, Pa., was announced in the July issue, was born on October 31, 1905, at Shreveport, La. He was graduated as a civil engineer from the University of South Carolina in 1926 and entered railroad service on July 13, 1926, as a rodman on the Pennsylvania, at Cape Charles, Va., being transferred to Baltimore, Md., on December 19, 1926. Mr. Cranwell was appointed assistant on engineer corps at Washington, D. C., on April 1, 1927, becoming assistant supervisor at Hollidaysburg, Pa., on May 12, 1927, and later serving successively at Jamesburg, N. J., and Jersey City, N. J. He was promoted to supervisor at Bordentown, N. J., on January 1, 1930, and on December 1, 1930, he returned to Jersey City as assistant supervisor. On October 16, 1931, he became assistant on engineer corps at Jersey City, and assistant supervisor at New York on November 16, 1931, being transferred to Downington, Pa., on June 3, 1932. On January 1, 1933, he went to Williamsport, Pa., as supervisor, being transferred to the East Liberty-Johnstown, Pa., subdivision on October 1, 1933. Mr. Cranwell was promoted to assistant division engineer at Philadelphia, Pa., on February 1, 1936, and was transferred to Fort Wayne, Ind., on July 1, 1937. On February 1, 1938, he became division engineer of the St. Louis division, with headquarters at Terre Haute, Ind., being transferred to the Columbus division on January 16, 1939. On October 1, 1939, he was transfrred to the Eastern division, at Pittsburgh, Pa., where he was located at the time of his recent appointment.

James L. Cranwell

Engineering

W. E. Taylor, engineer-accountant in the valuation department of the Missouri Pacific at St. Louis, Mo., has retired.

Kenneth Moore has been promoted to assistant engineer on the Cleveland, Cincinnati, Chicago & St. Louis (Big Four) at Springfield, Ohio, suceeding **R. L. Geis,** transferred to Cincinnati, Ohio.

J. L. Cox, assistant engineer on the New York Central, with headquarters at Chicago, has been appointed assistant engineer in charge of work equipment, with headquarters at Cleveland, Ohio, succeeding **F. W. Herbert,** who has retired.

William J. Turner, whose appointment as division engineer maintenance of way on the Atlantic Coast Line, with headquarters at Jacksonville, Fla., was announced in the July issue, was born on January 16, 1902, at Brundidge, Ala. Mr. Turner studied civil engineering at Alabama Polytechnic Institute, Auburn, Ala.,

and entered railway service as a rodman on the Atlantic Coast Line on June 1, 1925. Three months later he became a transitman and on September 1, 1928, he was promoted to junior engineer, being further advanced to assistant engineer on February 1, 1930. On June 1, 1933, Mr. Turner became office engineer, and on June 1, 1939, he was made senior assistant engineer, which position he was holding at the time of his recent promotion to division engineer.

M. M. Churchill, roadmaster on the Canadian National, with headquarters at Calgary, Alta., has been promoted to division engineer, with headquarters at Prince Albert, Sask., succeeding **Henry T. Ross,** whose death on May 13 was announced in the June issue.

R. R. Burchett, supervisor of track on the Chesapeake & Ohio at Huntington, W. Va., has been promoted to division engineer of the Chicago division, with headquarters at Peru, Ind., succeeding **H. A. Bertram,** whose death is reported elsewhere in these columns.

R. P. Kummer, instrumentman on the Evansville division of the Louisville & Nashville, has been promoted to assistant engineer on that division, with headquarters as before at Evansville, Ind., succeeding **Blair Hughes,** whose death on May 31 is announced elsewhere in these columns.

Roy Lumpkin, who for the past year has been supervising details of maintenance of way activities in the office of the assistant chief operating officer of the Chicago, Rock Island & Pacific at Chicago, has been promoted to assistant maintenance engineer, with the same headquarters, and with jurisdiction over maintenance of way and timber preservation. Mr. Lumpkin succeeds, in addition to his other duties, to the duties of **Charles F. Ford,** supervisor of ties and timber, whose death on June 9, was announced in the July issue. Mr. Lumpkin was born in Spring Garden, Mo., on May 3, 1891, and entered railway service at Eldon, Mo., in 1911, as a timekeeper in the maintenance of way department. He later served in various capacities in the office of the engineer maintenance of way of the First district at Des Moines, Iowa; in the office of the general manager at Kansas City, Mo., and at Chicago in the office of the assistant chief operating officer in charge of engineering and maintenance of way.

Roy Lumpkin

Ralph H. Meintel, assistant division engineer of the Ft. Wayne division of the Pennsylvania, has been promoted to division engineer of the Eastern division, with headquarters at Pittsburgh, Pa., succeeding **J. L. Cranwell,** whose promotion to superintendent of the Monongahela division was announced in the July issue, and **D. E. Smucker,** supervisor of track at Perrysville, Ind., has been advanced to assistant division engineer of the Ft. Wayne division, relieving Mr. Meintel.

Mr. Meintel was born at Altoona, Pa., on October 6, 1900, and graduated from Pennsylvania State college in 1923. He entered railway service on June 7, 1918, as a laborer in the shops of the Pennsylvania at Altoona, and during subsequent summer vacations he served as a chainman on the engineering corps. On June 18, 1923, Mr. Meintel became a rodman on the Middle division, being transferred to the Philadelphia division on July 1, 1924. On November 16, 1926, he was promoted to assistant supervisor of track on the New York division, being advanced to supervisor of track on January 1, 1928. While engaged in the latter capacity, he served successively on the Allegheny, Erie & Ashtabula, Panhandle and Middle divisions. On June 1, 1939, he was further promoted to assistant division engineer of the Ft. Wayne division, with headquarters at Ft. Wayne, Ind., which position he was holding at the time of his recent promotion.

Ralph H. Meintel

C. W. Van Nort, whose appointment as engineer maintenance of way, of the Central Pennsylvania division of the Pennsylvania was announced in the July issue, was born at Scranton, Pa., on April 2, 1891. He was graduated from Lehigh University in 1913 and entered the service of the Pennsylvania on June 15, 1913, as a rodman on the Monongahela division, later serving as transitman. On September 28, 1917, he was promoted to assistant supervisor on the Buffalo division, serving in the same capacity on the New York division, and was promoted to supervisor of the Pittsburgh division on January 18, 1927. Mr. Van Nort was appointed division engineer of the Erie and Ashtabula division on November 12, 1928, being transferred to the Pittsburgh division on December 22, 1930. He was promoted to superintendent of the Erie and Ashtabula division on July 1, 1933. He was appointed superintendent of freight transportation, Central Region, on June 15, 1934, becoming superintendent of the Wilkes-Barre division at Sunbury, Pa., in May, 1936. In February, 1937, he became division superintendent at Williamsport, which position he held at the time of his recent appointment.

C. W. Van Nort

George Auer, Jr., supervisor of track of Subdivision 24 of the Pennsylvania division of the New York Central, with headquarters at Corning, N.Y., has been promoted to assistant engineer of track, with headquarters at New York, to succeed **J. P. Ensign,** whose appointment as supervisor of track is noted elsewhere in these columns.

Mr. Auer has been in the service of the New York Central continuously for more than 22 years. He was born on October 10, 1896, at Tuckahoe, N.Y., and attended Columbia university, graduating with the degree of civil engineer. He entered the service of the New York Central on March 6, 1918, as a chainman in the office of the district engineer at New York, being advanced to rodman at the same point in the following May. On November 1, 1923, Mr. Auer was promoted to instrumentman, also at New York, and on April 16, 1924, he was further advanced to clearance engineer, in the office of the engineer maintenance of way at New York. On December 1, 1925, he became assistant supervisor of track at Rochester, N.Y., holding this position until late in 1937, when he was promoted to supervisor of track at Corning. He remained at the latter point until his recent appointment as assistant engineer of track.

Richard R. Metheany, whose appointment as assistant to the chief engineer maintenance of way of the Eastern region of the Pennsylvania, with headquarters at Philadelphia, Pa., was announced in the July issue, was born at Grand Rapids, Mich., in 1879. He received his higher education at the University of Michigan, and entered railway service in January, 1900, as an assistant on the engineer corps of the Grand Rapids & Indiana (controlled by the Pennsylvania), later serving in the same capacity on the Pennsylvania. From 1905 to 1912, he served as assistant divi-

sion engineer on the Marietta, Louisville, Zanesville and Eastern divisions. At the end of this period he was promoted to division engineer of the Marietta division, later serving in the same capacity on the Akron, Monongahela and Middle divisions. In 1927, Mr. Metheany was advanced to engineer maintenance of way of the Southern division, later being transferred to the Central Pennsylvania division, where he was located at the time of his recent promotion to assistant to the chief engineer maintenance of way.

Track

O. Palumbo has been appointed acting roadmaster on the Canadian National, with headquarters at Burns Lake, B.C., succeeding **D. Deneen,** who has retired.

M. Kubin, roadmaster on the Canadian Pacific, with headquarters at Revelstoke, B.C., has been transferred to Proctor, B.C., succeeding **C. Swanson,** who has been transferred to Revelstoke replacing Mr. Kubin.

H. J. Lattomus, assistant supervisor of track on the Pennsylvania at Denison, Ohio, has been promoted to supervisor of track, with headquarters at Toledo, Ohio, succeeding **L. L. Harding,** who has been transferred to Erie, Pa. **E. V. Kelly** has been appointed assistant supervisor of track at Denison, Ohio, replacing Mr. Lattomus.

E. Aubin, acting roadmaster of the Montreal Terminals division of the Canadian Pacific, has been promoted to roadmaster of that division, with headquarters at Montreal, Que., succeeding **F. J. Liston,** whose appointment as assistant superintendent of the Montreal Terminals division, with headquarters at Montreal, is announced elsewhere in these columns.

W. Patrick, section foreman on the Canadian National at Camrose, Alta., has been promoted to acting roadmaster, with headquarters at Edson, Alta., succeeding **Walter Bryant,** who has been transferred to Calgary, Alta. Mr. Bryant replaces **M. M. Churchill,** whose promotion to division engineer, with headquarters at Prince Albert, Sask., is announced elsewhere in these columns.

C. Baker, assistant engineer on the Gulf Coast Lines (Missouri Pacific at Kingsville, Tex., has been appointed roadmaster, with headquarters at Harlingen, Tex., succeeding **C. L. Stuckey,** who has been transferred to Beaumont, Tex. Mr. Stuckey replaced **Leander A. Mitchell,** whose death at Houston, Tex., on May 20, is announced elsewhere in these columns.

Hugh M. Richardson, whose promotion to roadmaster on the Southern Pacific, with headquarters at Dallas, Ore., was announced in the July issue, was born at Crescent City, Cal., on October 17, 1896, and entered railway service on January 19, 1921, as a section laborer on the Portland division of the Southern Pacific at Leland, Ore. On July 3, 1922, he was promoted to section foreman at Union Creek, Ore., and the following year he was transferred to Hugo, Ore. Mr. Richardson was transferred to Tangent, Ore., in August, 1932, where he was located until his recent promotion.

O. Robin has been appointed roadmaster on the Drummondville subdivision of the Levis division of the Canadian National, with headquarters at Drummondville, Que., to succeed **A. Malo,** who has been transferred to the Makamik subdivision of the Cochrane division, with headquarters at Cochrane, Ont., to replace **J. L. Hervieux,** transferred. **William Blackburn** has been appointed acting roadmaster on the Kapuskasing subdivision of the Cochrane division, with headquarters at Hearst, Ont., succeeding **E. L. Latimore,** transferred.

R. E. Blosser, assistant supervisor of track on the Pennsylvania at Cresson, Pa., has been promoted to supervisor of track, with headquarters at Kalamazoo, Mich., succeeding **H. E. Michaels,** who has been transferred to Camden, N.J., relieving **F. S. Bowden.** Mr. Bowden has been transferred to Perrysville, Ind., replacing **D. E. Smucker,** whose promotion to assistant division engineer of the Ft. Wayne division is announced elsewhere in these columns. **S. T. Richards,** assistant on the engineering corps, has been advanced to assistant supervisor of track at Cresson, Pa., succeeding Mr. Blosser.

L. F. Shields, assistant on the engineer corps of the Pennsylvania, has been promoted to assistant supervisor of track at Harrisburg, Pa., to succeed **J. E. Chubb,** who has been transferred to Wilmington, Del., to replace **W. T. Rice,** who has been promoted to supervisor of track as reported in the July issue. **H. P. Morgan,** assistant on the engineer corps, has been promoted to assistant supervisor of track at Baltimore, Md., to succeed **L. E. McCarl,** who has been transferred to New York. **H. H. Vaughn,** assistant supervisor of track at Lewistown, Pa., has been transferred to Newport, Del., to succeed **W. B. Blix,** who has been transferred to New York. **L. H. Miller,** supervisor of track at Harrington, Del., has been transferred to York, Pa.

S. T. Montgomery, whose promotion to track supervisor on the Southern, with headquarters at Huntingburg, Ind., was announced in the July issue, was born at Solway, Ky., on September 8, 1915, and graduated in engineering from the University of Kentucky in 1936. He entered railway service on December 12, 1936, as a student apprentice on the Western lines of the Southern, and on May 1, 1938, he was promoted to assistant bridge and building supervisor at Princeton, Ind. Four months later he was appointed assistant to the roadmaster at Somerset, Ky. Mr. Montgomery was promoted to assistant supervisor of track on the Birmingham division, with headquarters at Birmingham, Ala., on March 1, 1939, and on February 1, 1940, he was transferred to the Alabama Great Southern (part of the Southern) with the same headquarters, which position he held until his promotion to track supervisor on June 24.

W. L. D. Johnston, assistant track supervisor on the Southern at Alexandria, Va., has been promoted to track supervisor, with headquarters at Shelby, N.C., to replace **A. H. Graham,** who has been transferred to Strasburg, Va. Mr. Graham succeeds **J. M. Boles,** assistant roadmaster, who has retired after 50 years of service. The position of assistant roadmaster has been abolished. **N. B. Lewis,** a student apprentice on the Danville division, has been promoted to assistant track supervisor at Alexandria, to succeed Mr. Johnston. **W. E. Manning,** a student apprentice at Salisbury, N.C., has been promoted to track supervisor, with headquarters at Camden, S.C., succeeding **W. H. Oglesby,** whose promotion to assistant trainmaster is noted elsewhere in these columns.

Mr. Johnston was born on February 28, 1912, at Lincolnton, N.C., and attended the University of North Carolina. He entered railway service with the Southern on September 7, 1936, as a rodman in the office of the chief engineer maintenance of way and structures of the Eastern lines, with headquarters at Charlotte, N.C. On March 1, 1938, he became a student apprentice, and on August 1, 1939, he was advanced to assistant track supervisor at Alexandria, which position he was holding at the time of his recent promotion to track supervisor.

J. P. Ensign, assistant engineer of track of the New York Central, Lines East, has been promoted to supervisor of track of Subdivision 28 of the Electric division, with headquarters at New York, to succeed **T. C. Gunsallus,** who has been transferred to Subdivision 3 of the Eastern division, with headquarters at Beacon, N.Y., to replace **T. H. Gurnett,** who has retired. **F. A. Haley,** bridge and building inspector on the Eastern division at Beacon, has been promoted to supervisor of track of Subdivision 24 of the Pennsylvania division, with headquarters at Corning, N.Y., to replace **George Auer, Jr.,** whose appointment as assistant engineer of track is noted elsewhere in these columns.

Mr. Ensign has been in the service of the New York Central for 17 years. He was born on June 7, 1898, in New York state, and obtained his higher education at Union college. He entered railway service with the New York Central on May 15, 1923, as a draftsman, being appointed track inspector on the Electric division on September 1, 1925. In the following year Mr. Ensign was promoted to assistant supervisor of track on the same division, and on September 1, 1933, he was further promoted to assistant division engineer of the Eastern division, with headquarters at New York. In 1938, he was appointed assistant engineer of track, with headquarters at New York, which position he was holding at the time of his recent appointment as supervisor of track.

Mr. Haley has been identified with the New York Central for nearly 20 years. He was born on January 7, 1894, at Watertown, N.Y., and attended Cornell university, graduating with a degree in civil engineering. He entered the service of the New York Central on September 12, 1920, as a rodman at Watertown, being advanced to transitman on September 16, 1922. He was further promoted to assistant supervisor of track, with headquarters at Malone, N.Y., on April 16, 1929, being transferred to Hudson, N.Y., on October 20, 1931. Mr. Haley became a

bridge and building inspector on October 1, 1937, and continued to hold this position until his recent appointment.

Bridge and Building

Henry Espeland, assistant bridge and building supervisor on the Northern Pacific at Missoula, Mont., has been promoted to bridge and building supervisor, with headquarters at Fargo, N.D., succeeding **Seymour H. Knight,** who has been promoted to supervisor of work equipment, with headquarters at St. Paul, Minn.

Obituary

Blair Hughes, assistant engineer of the Evansville division of the Louisville & Nashville, with headquarters at Evansville, Ind., died at that point on May 31.

Leander A. Mitchell, roadmaster on the Gulf Coast Lines (Missouri Pacific), with headquarters at Beaumont, Tex., died on May 20 of a heart attack at St. Joseph's Infirmary, Houston, Tex., after a short illness.

H. A. Bertram, division engineer on the Chesapeake & Ohio, with headquarters at Peru, Ind., died at the Memorial hospital, Richmond, Va., on July 6. Mr. Bertram had been in ill health for about a year.

Madison McHargue, track supervisor on the Louisville & Nashville at London, Ky., died on June 16. Mr. McHargue was born at Lily, Ky., on January 1, 1876, and entered railway service in 1891 as a section laborer on the L. & N. at Lily. In 1905, he was promoted to assistant section foreman and later the same year was advanced to foreman. In 1917 he was appointed track supervisor at Butler, Ky., later being transferred to Livingston, Ky., and London.

Michael J. Connerton, who retired in September, 1937, as track supervisor on the Illinois Central at Chicago, died on July 13 at the Billings hospital in that city. Mr. Connerton served for a number of years as a track supervisor on the Illinois Central in Southern Illinois, and in 1903 he went with the Chicago Great Western as roadmaster at Byron, Ill. Three years later he went with the Missouri Pacific as division engineer, with headquarters at Chester, Ill. The following year he became a division engineer on the Cincinnati, New Orleans & Texas Pacific (now part of the Southern), at Somerset, Ky., and a short time later his title was changed to roadmaster. In 1908, he was transferred to Danville, Ky. Several years later Mr. Connerton return to the Illinois Central and remained with that road until his retirement.

Arent B. Scowden, general bridge inspector of the Baltimore & Ohio, Western lines with headquarters at Cincinnati, Ohio, whose death was announced in the July issue, was born in Norway on May 19, 1877, and graduated from the Polytechnical Institute of Christiana. In 1904, he entered railway service with the B. & O., as a draftsman and in 1906, he went with the Carolina, Clinchfield & Ohio (now the Clinchfield), returning to the B. & O., in 1908, as chief draftsman in the bridge department. Mr. Scowden was promoted to assistant engineer of bridges, Western lines, with headquarters at Baltimore, Md., in 1916, and two years later, he was advanced to engineer of bridges, Western lines, with headquarters at Cincinnati. In March, 1920, his title was changed to assistant engineer of bridges, with the same headquarters. In the latter part of 1927, Mr. Scowden was appointed general bridge inspector at Cincinnati.

Charles C. Warne, purchasing agent of the New York Central at New York, and an engineer by training and experience, died on July 6, in Yonkers, N.Y., at the age of 58. Mr. Warne was born in England, on July 15, 1881, and received his education at the University of Pittsburgh, from which he was graduated in 1903. He obtained his first railroad experience in 1903, as a rodman in the maintenance of way department on the Western division of the New York Central & Hudson River (now New York Central). From January, 1904, to March, 1905, he served as assistant supervisor of track and on the latter date he was appointed transitman and draftsman. In April, 1906, Mr. Warne was appointed assistant division engineer, and from September, 1912, to January 1, 1914, he served as lumber agent. In January, 1914, he was promoted to assistant to the purchasing agent, becoming first assistant to the purchasing agent in April, 1919, and purchasing agent in March, 1931.

Charles C. Warne

Ralph Modjeski, prominent bridge designing engineer of Chicago, and for many years an engineer or consultant on the construction of many large railroad bridges in the United States and Canada, died at the age of 79 on June 26 in Los Angeles, Cal., after a long illness. Mr. Modjeski was born in Poland and came to this country in 1876. His most famous works include the Quebec cantilever over the St. Lawrence river, the Philadelphia-Camden suspension bridge and the San Francisco Bay bridge. His early fame, however, was built on the construction of a series of notable simple span railroad bridges across the Mississippi, including the Thebes and Memphis bridges. Mr. Modjeski was the holder of some of the highest honors in the engineering profession, including the John Fritz medal and the Washington Award prize of the Western Society of Engineers.

Supply Trade News

General

The Air Reduction Company has just completed the construction of an acetylene plant at West Berkeley, Cal. The new plant is located a short distance from the site of the old plant, and will include all modern equipment for the manufacture of acetylene and the filling, compressing and handling of cylinders.

Personal

Clinton E. Stryker, formerly a partner of McKinsey, Kearney & Company, management engineers, Chicago, has been appointed vice-president and assistant to the president of the **Nordberg Manufacturing Company,** Milwaukee, Wis.

Mowry E. Goetz has been appointed district manager at Chicago for the **Republic Steel Corporation,** Cleveland, Ohio, succeeding **J. L. Hyland,** who has been appointed district manager at Cleveland, and **F. R. Ward** has been appointed assistant district manager at Chicago.

Allen W. Morton, vice-president of the **Koppers Company,** in charge of the American Hammered Piston Ring Division, has been granted a leave of absence to serve as a full-time special assistant to Edward R. Stettinius, Jr., chairman of the Advisory Commission to the Council of National Defense.

John W. Alden has been appointed mill metallurgist for the steel and tube division of the **Timken Roller Bearing Company.** Mr. Alden was employed as metallurgist for the United Steel Company, the Central Alloy Steel Corporation, and Republic Steel Corporation before becoming a member of the staff of the Timken Roller Bearing Co.

Trade Publications

P & H-Hansen Welders—The Harnischfeger Corporation, Milwaukee, Wis., has published two bulletins, W-26 and W-28, describing the features of its line of P & H-Hansen square frame welders. Bulletin W-26 describes the type WA-200-H253W welder, including such features as the single current control and various applications of the multiple unit hook-up system. Bulletin W-28 deals with the new WD-150-H205W welder.

International Power Units—The International Harvester Company, Chicago, has published a 16-page pamphlet A-50-DD, which describes its new line of gasoline power units, the U-2, U-4, U-6, U-21, and PA-100, ranging from 22 to 110 hp., and its new line of Diesel power units, the UD-6, UD-9, UD-14, and UD-18, with capacities ranging from 39 to 100 hp. The pamphlet is attractively printed in color and well illustrated with photographs and drawings. The features of construction of the various units are described and complete specifications and graphs of output characteristics are presented for each.

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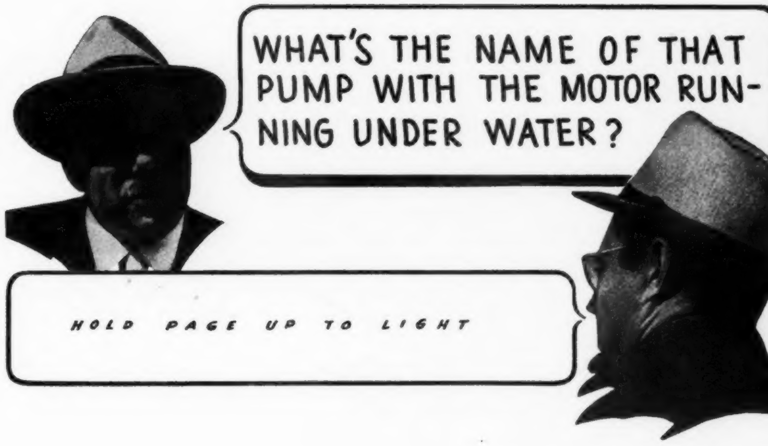

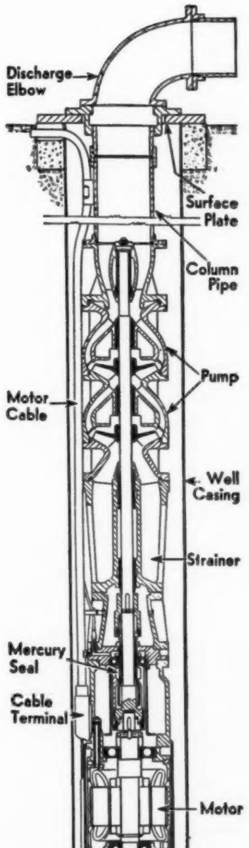

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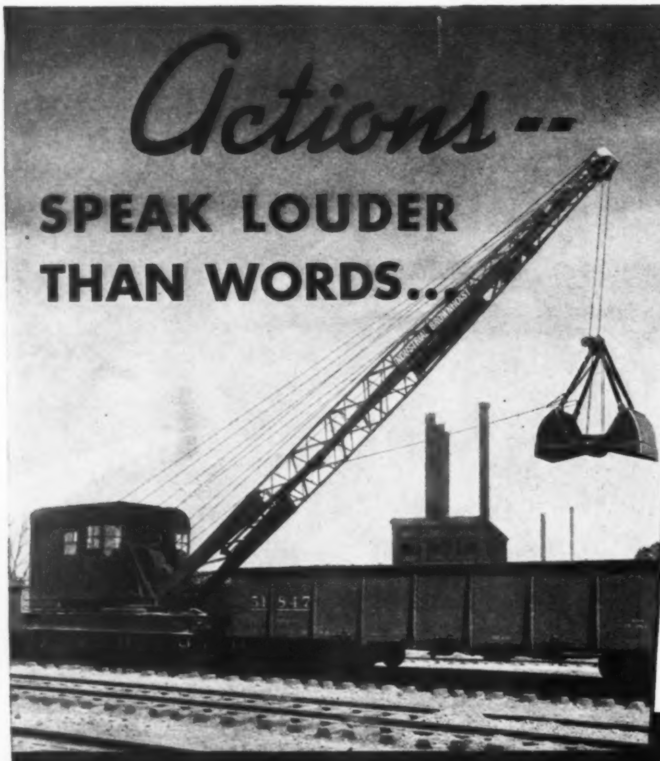

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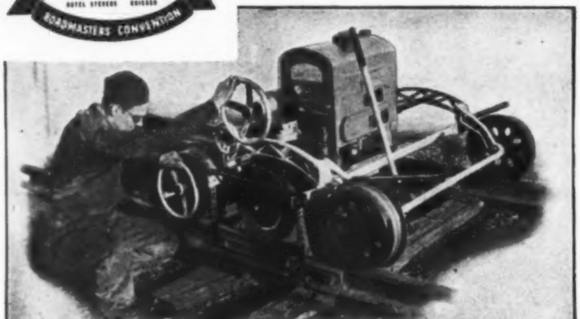

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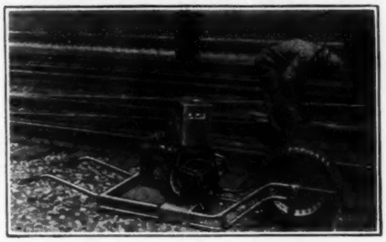

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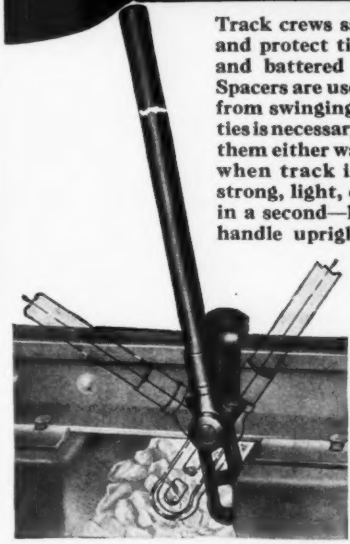
SALES OFFICES IN ALL PRINCIPAL CITIES

Don't Maul Ties—Space Them Easier with a Simplex G-Y Tie Spacer!



Track crews save time, get more done and protect ties from being splintered and battered when Simplex G-Y Tie Spacers are used. Workers are protected from swinging mauls as no sledging of ties is necessary—the G-Y quickly moves them either way to the desired position, when track is out of face. They are strong, light, easy to use—on or off rail in a second—have safety stops to keep handle upright. Fit over ball of rail.

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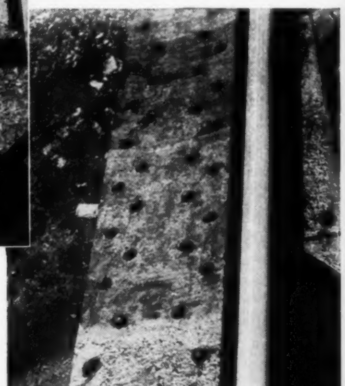
(Left) Original condition of rivets and steel after old ties were removed, showing heavy scale formation.



(Right) Same section after scale was removed by flame cleaning. Lower section has been repainted, with a heavy coat of asbestos fibre paint.

TRACK SUPPLY ASSOCIATION
SEPT. 9-12, 1940
EXHIBITOR
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